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Annual Report of the Department of Agriculture, 1936

VOLUME I

Part I.—Agriculture in Kenya in 1936

Weather

(For the following notes the Department is indebted to the Director of the British East African Meteorological Services.)

In the Trans Nzoia rainfall was considerably above normal during the four months January to April and generally below for the remainder of the year. In November it was 61 per cent below normal. The principal rain fell in April and June, instead of, as normally occurs, in May and July to August.

In the Kavirondo district the greatest abnormality of rainfall occurred in January, and was 158 per cent above normal. The heaviest rains were recorded in February, March and April, instead of in April, May and August as indicated by the average values.

West of the Rift the greatest departure from the average occurred in January and February, when falls were recorded 156 per cent and 174 per cent above normal. The March and April falls were also well above normal, whereas the remaining months were generally below; December was 30 per cent above.

East of the Rift the largest excess over the normal occurred in February with 240 per cent above. In the remaining months also rainfall was in excess, except for May, July, November and December, when it was slightly below.

In the Rift the heaviest rainfall occurred in April, instead of in May, as normally. The greatest departure from normal was in February with 263 per cent above normal. The months with excess rainfalls compared with the normal were January to April, June and October.

On the Coast rainfall was very variable in relation to the normal. The greatest excess over the average occurred in June, with 149 per cent above. The months of January, February, April, June, September and December were above while other months were below the normal.

In the main coffee areas the greatest excess over the average occurred in February with 223 per cent above. Only five months, January to April and June, were above normal; all the others were below.

The main feature of the season has been a general excess in the early half of the year with defects in the latter half. In all areas the rainfall, in the mean for the year, was above normal; this excess was most pronounced in the Rift, east of the Rift, and at the Coast where it was a little over 20 per cent. February showed the greatest excess abnormality in the higher parts of the Colony, while on the Coast it occurred in June.

A table of percentage departures from the average is shown below for each of the main agricultural areas:—

PERCENTAGE DEPARTURES FROM AVERAGE IN THE MAIN AGRICULTURAL DISTRICTS

1936

Agricultural Districts	Trans Nzoia	Kavirondo	West Rift	East Rift	Rift	Main Coffee Area	Coast
No. of Stations	20	17	15	13	25	20	18
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
January	+114	+158	+156	+60	+185	+42	+86
February ..	+162	+97	+174	+240	+263	+223	+112
March	+48	+40	+81	+57	+73	+22	—43
April	+44	+11	+36	+60	+75	+19	+74
May	—36	—17	—35	—34	—40	—50	—38
June	+45	+23	+19	+79	+11	+62	+149
July	—21	—21	—35	—14	—36	—75	—13
August	—18	—6	—7	+7	—6	—17	—20
September ..	+14	—3	0	+43	—3	—32	+27
October	—9	—16	—17	+31	+14	—7	—24
November ..	—61	—25	—46	—31	—33	—31	—45
December ..	+17	+38	+30	—14	+2	—50	+87
YEAR ..	+10	+13	+13	+23	+19	+4	+21

GENERAL

The year 1936 was notable for a definite turning point in the psychological attitude both of the farming community and of the Department. Previously such signs of recovery as existed were regarded with misgiving or as mere fluctuations in a new social order which had supervened since 1929. Now for the first time it began to seem possible that the depression was like others before it, and that there might be a return

eventually to conditions more like those of the period before 1930. An expansionist psychology became evident. Farmers began to plan for further development; to look to the future in such matters as care of the soil and the adoption of a balanced system of farming.

The organization of the Department was carefully reviewed during the year by Sir Alan Pim, with the assistance of Mr. Milligan, and various recommendations made for reorganization and reduction of expenditure. Most of these recommendations, if not all, will be implemented during 1937. A whole-time team for research and extension work on coffee has been set up, under the direction of the Senior Plant Breeder and Experimentalist. Plans for the separation of the Animal Industry Division as an independent Veterinary Department are on foot.

One of the first moves in this more forward policy arose out of the appointment of a Meat and Live Stock Inquiry Committee, and took the form of an agreement with Messrs. Liebig's to establish a meat extract factory at Athi River. Conversations were conducted also with another firm, on the subject of the establishment of a freezing works for the export of frozen and chilled meat. These particular developments are due in large measure to the efforts of the Secretary to the Committee, Mr. R. Daubney.

A matter which is worthy of some mention is that of publicity. The agricultural community is now well served in this respect. A number of useful articles have appeared in the *East African Agricultural Journal,* though the circulation of this periodical is not yet all that could be desired. Coffee-growers are provided for specially by the monthly *Bulletin* of the Coffee Board, a most informative publication on all aspects of the coffee industry. The *Monthly Trade and Information Bulletin,* sponsored by the Standing Board of Economic Development, contains up-to-date information on production prospects and current prices.

In addition to these special publications, the agricultural industry is receiving improved service from the general daily and weekly Press in the Colony. I am glad to acknowledge the very useful service provided by the Press in the dissemination of information emanating from the Department as well as from other sources.

A new departure is the institution of weekly broadcast talks to farmers. These are arranged by the Royal Agricultural and Horticultural Society and broadcast through the courtesy

of Messrs. Cable & Wireless Limited. Both members of the Department and practical farmers contribute to these talks, which are much appreciated by farmers.

Agricultural Credit

The Land and Agricultural Bank Ordinance of 1930 was amended during the year to provide for raising the maximum for loans for the discharge of existing onerous mortgages from £2,000 up to £3,500, and the maximum which may be advanced for all purposes from £3,000 to £5,000. Among other amendments was provision for advances of up to £200 for the prevention of soil erosion.

The Colony was authorized to issue a further loan, of which £500,000 was to be devoted to Land Bank purposes. Of £375,000 to be issued immediately, £250,000 was earmarked for Land Bank purposes, including £100,000 for the purpose of financing the operation of the Farmers' Conciliation Board.

The additional Land Bank capital of £150,000 was obtained at the favourable rate of 3.07 per cent. The benefit accruing from this and from the extended operations of the Bank will eventually be passed on to borrowers, but at the present time outstanding interest charges and frozen assets in the shape of farm properties render it inadvisable to do so.

During 1936, 88 mortgage loans, aggregating £117,665 were issued, and 32 short-term loans aggregating £6,655. Of the loans issued, 45 per cent were for the purpose of discharging prior mortgages, 22 per cent for permanent improvements, 19 per cent for purchase of land, and 14 per cent for purchase of stock and implements and farming operations. The total loans issued up to the end of 1936 amounted to £631,260 long term and £13,825 short term, of which £45,100 and £2,165 respectively have been repaid.

The Agricultural Advances Ordinance was continued in operation during the year. The number of accounts dealt with was reduced from 62 to 53. In six cases the accounts were written off as bad debts. The total amount owing on account of principal and interest declined from £106,594 at the beginning of the year to £95,335 at the end, the bad debts written off representing an amount of £12,394. During the year new advances to the amount of £8,456 were issued.

The Agricultural Indebtedness Committee, appointed by Government in 1935 to explore the possibility of lightening the burden of agricultural indebtedness, issued an interim report in 1936. The Committee observed that there existed a considerable number of planters embarrassed by a variety of commitments to secured and unsecured creditors to such an extent that the creditors could not be satisfied in full from the result of the next season's operations. The farmer in such a position was under a threat of dispossession, involving needless and unjust loss of his equity in his business. The danger was becoming more real with the prospect of an improvement in economic conditions. As a result of the recommendations of the Committee the Farmers' Assistance Ordinance was passed. This made provision for thorough examination of a farmer's position before foreclosure could take place. A Farmers' Conciliation Board was appointed, with local committees. On application by a farmer a stay order could be issued and a temporary supervisor appointed. The Board would then assume control of the applicant's affairs for the time being and endeavour to effect an arrangement with his creditors, to be embodied in a deed of adjustment.

A further recommendation of the Committee was that the machinery of the Farmers' Assistance Ordinance should cover the provision of seasonal finance and assistance to cereal farmers to change over to mixed farming.

Marketing

In the sphere of marketing, the Native Produce Improvement and Inspection Rules, 1936, under the Crop Production and Live Stock Ordinance, consolidated previous legislation in regard to the marketing of produce in native reserves. The new Rules provided for the compulsory inspection of native produce at specified centres, and prohibited purchase and sale at places within three miles of such inspection centres. Traders were required to put a distinguishing mark on all produce consigned to places outside the district. Purchase of produce between the hours of 6 p.m. and 6 a.m. was prohibited.

Under the Marketing of Native Produce Ordinance a comprehensive scheme of organized marketing has been set up. The existing trading centres and native markets in the Central Province have been gazetted as markets for the purpose of the Ordinance. In addition, buying centres have been created at intervals throughout the reserves, so that no native producer has an undue distance to traverse for disposing of his crops. No trading in produce may take place outside these

markets. At these markets and buying posts the traders are licensed and only those possessing a licence, costing Sh. 2, may trade in produce. The number of plots available for traders are restricted to an amount thought necessary to deal with the produce coming into the market. The new organization has had a most beneficial effect in producing competition and stabilizing prices. Produce is collected at these outside buying centres and taken to the larger centres for sale direct to a large wholesale dealer and exporter.

Provision was made also for the compulsory inspection of maize grown by squatter natives in the Nakuru district, estimated at over 200,000 bags annually, and the system of organized markets for this crop was introduced as for the Central Province.

The Cotton (Amendment) Ordinance, 1936, conferred wider powers of control over the industry. It followed the general lines of legislation in Uganda, and enabled the Governor in Council to make rules providing, *inter alia*, for the fixation of minimum prices and the control or prohibition of the movement of cotton from one area to another.

The compulsory grading of produce for export, formerly applied to maize, wheat and potatoes, was extended to beans. In the case of beans, however, conditioning or fumigation prior to export was made obligatory.

The Sisal Industry Ordinance was amended during the year to provide for the grading of sisal to be brought under the ægis of the Sisal Industry Committee. The Committee was given power to prescribe standards of grades and to control the issue of certificates entitling growers to use a standard mark on sisal fibre which had been graded in accordance with these standards. The powers of the Committee in regard to the expenditure of moneys derived from the sisal levy were widened, and the levy was made applicable to exported sisal rope and cord.

Rules under the Crop Production and Live Stock Ordinance were enacted to protect the flax seed industry, providing that seed exported must be clean, and must be tested for purity and germination, showing not less than 98 per cent purity and 92 per cent germination. Sowing of seed for the purpose of export must be notified to the Director of Agriculture, and no seed is imported except under permit.

A step towards putting the fruit industry on a more stable footing was taken with the formation in July of a Kenya

Fruit Growers' Association. The object of the Association is to organize the marketing of Kenya fruit, both locally and overseas.

Agricultural Statistics

As stated in last year's Report, the Agricultural Census is now being taken biennially, instead of annually as formerly. No census was taken in 1935. Owing to the staff position it has not been possible to complete tabulation of the 1936 census up to the date of compilation of this report. It is hoped that it will be possible to issue a separate Census Report shortly. Since the bi-monthly crop forecasts depend upon data from the census, it has not been possible to undertake this service during the 1936-37 season. Current conditions are now reported monthly in the Trade and Information Bulletin compiled under the auspices of the Standing Board of Economic Development, and a separate departmental crop report will not, in future, be issued.

Agricultural Exports in 1936

The value of agricultural produce exported from the Colony during 1936 amounted to £3,278,662. This exceeds the 1935 figure by £768,447, and is the highest in the history of the Colony. The chief increases were:—

	£
Sisal	267,347
Tea	118,643
Cotton	73,463
Maize	48,406
*Pyrethrum	47,905
Butter	36,912
Coffee	34,881
Cattle, for food	32,667
Skins, sheep and goat	31,288
Groundnuts	29,640
Sugar	23,325
Wheat	22,404

* Not separately recorded in 1935.

The chief decreases were:—

	£
Hides	20,058
Wheat flour	9,190

The increase was thus an all-round one, affecting both plant and animal produce. It was due in part to increases in overseas values, but increases in quantity were also largely

responsible. The changes in quantity in the case of the more important products were as follows:—

	Increase.	*Decrease.*
Butter (cwt.)	8,696 ...	—
Hides (cwt.)	— ...	28,222
Goat skins (No.)	603,809 ...	—
Coffee (cwt.)	49,379 ...	—
Cotton (centals)	29,734 ...	—
Maize (cwt.)	253,775 ...	—
Wheat (cwt.)	44,971 ...	—
Sugar (cwt.)	45,849 ...	—
Tea (cwt.)	21,991 ...	—

QUANTITIES OF AGRICULTURAL COMMODITIES, THE PRODUCE OF KENYA EXPORTED DURING THE YEARS 1932 TO 1936 INCLUSIVE

Details	Unit of Quantity	1936	1935	1934	1933	1932
Animals, Living						
Cattle	No.	7,393	3,486	344	331	329
Sheep and Goats	„	8,897	5,491	4,094	3,735	5,392
Animal Produce						
Bacon and Ham	Cwt.	1,168	989	757	691	543
Beeswax	„	808	1,184	1,807	954	1,050
Butter	„	24,983	16,287	11,330	7,514	9,242
Cheese	„	794	756	602	473	512
Ghee	„	3,965	4,532	2,927	2,309	1,689
Hides—						
Sun-dried	„	28,317	54,340	80,618	91,733	53,506
Shade-dried	„	24,145	26,344	20,033		
Meat, Fresh and Preserved	„	2,332	1,842	1,773	3,927	1,164
Skins—						
Sheep and Goats	No.	1,794,060	1,190,251	979,585	960,610	524,329
Wool	Cntls	13,026	12,626	10.022	9,330	9,523
Crop Produce						
Coco-nuts and Copra	ton	488	—	—	—	—
Coffee	Cwt.	409,262	359,883	187,017	257,214	276,041
Fibres—						
Cotton	Cntls	58,152	28,418	11,748	10,752	4,516
Sisal	ton	34,746	32,136	24,016	19,850	15,385
Fodder and Offals	„	4,746	4,764	1,674	1,238	964
Grains, Pulses and Meals—						
Beans	Cwt.	33,693	30,464	17,383	13,495	17,636
Maize	„	1,452,380	1,198,605	439,958	1,131,549	514,917
Maize Meal	„	137,761	106,743	90,895	24,924	5,626
Pulse (other than Beans)	„	6,318	3,025	3,239	5,314	5,236
Wheat	„	45,996	1,025	2,004	118	1,727
Wheat Flour	„	61,375	77,561	47,421	41,076	30,221
Miscellaneous	„	16,748	24,056	14,797	13,068	336
Oil Seeds—						
Cotton	ton	1,066	1,202	291	103	170
Groundnut	„	2,503	269	11	397	124
Linseed	„	—	—	168	413	—
Sesame	„	2,407	1,959	1,529	3,242	2,270
Sunflower	„	316	—	—	—	—
Oils—						
Coco-nut	Gallon	18,446	3,724	16,915	44,756	9,660
Essential	„	2,640	3,961	2,477	3,739	4,433
Groundnut	„	1,977	5,853	12,801	—	5,344
Sesame	„	81,756	94,486	18,068	39,845	28,125
Potatoes	Cwt.	103,347	96,675	40,445	51,192	68,130
Pyrethrum	„	20,798	—	—	—	—
Sugar (Raw and Crystallized)	„	131,904	86,055	73,364	82,644	16,046
Tea	„	67,099	45,108	22,115	17,462	6,252
Wattle Bark	„	240,914	223,138	258,177	216,081	236,545
Wattle Extract	„	110,272	101,888	49,734	28,759	9,809

From Figures Supplied by the Commissioner of Customs

VALUES OF AGRICULTURAL COMMODITIES, THE PRODUCE OF KENYA EXPORTED DURING THE YEARS 1932 TO 1936 INCLUSIVE

Details	1936	1935	1934	1933	1932
	£	£	£	£	£
Animals, Living for Food					
Cattle	50,898	18,231	579	537	476
Sheep and Goats	4,313	2,755	2,302	1,788	2,670
Miscellaneous	221	324	264	291	224
Animal Produce					
Bacon and Ham	7,247	6,369	5,022	4,638	3,498
Beeswax	4,044	4,933	7,046	3,935	4,129
Butter	96,564	59,652	41,266	27,268	40,604
Cheese	3,248	3,318	2,576	2,186	2,421
Ghee	11,367	11,638	7,951	7,118	6,684
Hides—					
Sun-dried	57,944	86,111	125,428	132,103	87,067
Shade-dried	65,536	57,427	43,122		
Meat, Fresh and Preserved	9,112	7,472	5,983	9,516	5,563
Skins—					
Sheep and Goats	67,137	35,849	26,089	20,496	16,167
Wool	44,174	41,710	30,037	38,481	39,293
Crop Produce					
Coco-nuts and Copra	5,802	638	25	1,165	537
Coffee	969,804	934,923	493,343	832,353	1,214,392
Fibres—					
Cotton	149,789	76,326	28,483	23,584	8,589
Sisal	690,459	423,112	311,371	249,868	186,575
Fodder and Offals	16,474	16,034	3,787	4,969	3,650
Grains, Pulses and Meals—					
Beans	11,346	9,368	6,672	4,441	5,473
Maize	233,371	184,965	104,754	212,699	117,677
Maize Meal	20,716	20,002	25,755	5,815	1,456
Pulse (other than Beans)	2,011	1,635	1,534	2,022	1,823
Wheat	22,883	479	591	50	525
Wheat Flour	40,540	49,730	30,603	25,158	18,777
Miscellaneous	4,227	5,657	3,633	3,144	109
Oil Seeds—					
Cotton	2,867	3,210	694	309	533
Groundnuts	32,857	3,217	90	3,215	1,260
Linseed	—	—	1,504	3,202	2
Sesame	27,856	20,917	16,162	36,761	28,535
Oils—					
Coco-nut	1,983	354	1,007	4,118	1,097
Essential	7,637	7,823	6,799	8,777	9,355
Groundnut	277	727	1,116	—	630
Sesame	12,086	15,201	1,735	4,099	3,877
Sunflower	2,526	2,080	—	—	—
Potatoes	21,361	21,372	9,170	10,704	15,386
Pyrethrum	47,905	—	—	—	—
Sugar (Raw and Crystallized)	76,301	52,976	57,781	66,963	17,879
Tea	335,690	217,047	112,062	76,667	29,262
Wattle Bark	48,747	44,570	51,658	46,614	78,811
Wattle Extract	64,298	58,992	28,711	20,150	7,055
Other Agricultural Produce	6,494	3,071	—	—	—
Total £	3,278,662	2,510,215	1,596,705	1,895,204	1,962,061

From figures supplied by the Commissioner of Customs

Crops

Coffee

The Kenya Coffee Board Register showed that at the 1st January, 1936, there were 978 registered coffee estates, with a total area under coffee of 104,488 acres.

The 1935-36 crop yielded heavily and exports during the crop year (including, however, some stocks carried over from the previous year) aggregated 409,949 cwt. of raw coffee.

The weather in the early months of the year was generally favourable and enabled the trees to make a good recovery from the setbacks of the last few years. In eastern districts, however, the "long rains" ceased early, the "short rains" were scanty, and the last months of the year and the early months of 1937 were unusually dry and hot.

In western districts favourable weather was experienced throughout the year.

Exports during the first eight months of the 1936-37 crop season amounted to 278,153 cwt., as compared with 305,903 cwt. during the same period in the 1935-36 season.

At the time of writing (April), favourable rains have fallen in all districts.

Prices on the London market showed some recovery towards the end of the year, and there was a welcome reduction in stocks held in London.

Monthly average prices realized at London auctions during the last five years have been as follows:—

SHILLINGS PER CWT.

Month	1936	1935	1934	1933	1932
January	64	80	60	73	108
February	66	84	74	67	106
March	65	73	79	62	93
April	55	66	70	57	75
May	49	54	65	56	66
June	48	38	52	59	58
July	45	36	57	57	60
August	53	37	52	55	64
September	60	38	64	57	82
October	67	47	40	55	75
November	67	52	54	62	72
December	67	47	57	58	71

(Figures for 1936 by courtesy of the Coffee Board of Kenya. Those for previous years are as received by the Department from London).

Monthly average prices realized at Nairobi Coffee Auctions during 1936 were:—

	1936. *Per cwt.*
January	Sh. 35
February	Sh. 35
March	Sh. 31
April	Sh. 27
May	—
June	—
July	Sh. 25
August	Sh. 34
September	Sh. 35
October	Sh. 37
November	Sh. 43
December	Sh. 43

A noticeable feature of the coffee trade has been a marked increase in the proportion consigned direct to the United States and Canada. The following table, compiled through the courtesy of the Secretary to the Coffee Board from monthly returns supplied by the Customs Department, shows the extent of this movement. The figures include small quantities of unhulled and parchment coffee consigned to African and Arabian ports.

Destination	1933	1934	1935	1936
	Cwt.	*Cwt.*	*Cwt.*	*Cwt.*
United Kingdom ..	164,709	83,603	157,478	125,707
Canada and U.S.A. ..	29,659	52,347	123,497	208,383
Union of South Africa	18,336	14,217	20,477	21,748
Other Countries ..	44,268	36,592	56,618	52,738
Total Exports ..	256,972	186,759	358,070	408,576
Total British	222,170	129,710	234,317	202,096
Total Foreign.. ..	34,802	57,049	123,753	206,480

The following table, compiled from figures supplied by the Commissioner, H.M. Eastern African Dependencies Trade and Information Office, London, shows the imports into Great Britain and Northern Ireland of coffee consigned from Kenya, and deliveries at the preferential rate of duty for home consumption:—

Year	Imports into United Kingdom	Exports from United Kingdom	Deliveries for Home Consumption at the Preferential Rate of Duty
	Cwt.	*Cwt.*	*Cwt.*
1936 ..	109,031	29,243	107,922
1935 ..	158,225	28,533	104,113
1934 ..	93,033	51,009	110,168
1933 ..	222,415	87,979	117,252
1932 ..	227,807	62,457	—

Arabica coffee is now being grown by natives under supervision, but the plantings to date are small.

Reference to the formation of a whole-time team for research work on coffee has been made above. The planning of a research programme is being undertaken with the help of a Research Committee, composed of members of the Department and nominees of the Coffee Board.

An important step towards inter-territorial collaboration in matters affecting the industry has been taken by the formation of an East African Coffee Producers' Committee, of which the Secretary to the Governors' Conference is chairman.

Maize

The 1935-36 season was favourable so far as weather conditions are concerned. Exports during the calendar year 1936, which correspond fairly closely with the surplus of the 1935-36 crop season, amounted to 1,452,380 cwt., as compared with 1,198,605 cwt. in the previous year. The recorded value was £233,370, as compared with £184,965 in 1935.

The year opened with the London price at the low level of Sh. 16/6 per quarter. As indicated in the last Annual Report, a motion was adopted in Legislative Council appropriating a sum of £12,500 for the purpose of guaranteeing, so

far as this sum allowed, a minimum return on maize for export during the season of Sh. 4/50 per bag (basis K2, f.o.r. grower's station). It was hoped that this would avert a complete collapse of the local market. The market was probably steadied by the measure, but prices remained low. The price of native-grown maize in Kisumu and Thika fluctuated around Sh. 3 per bag during the first half of the year. Thereafter, with the drought in North America, and the general rise in wholesale commodity prices, a steady rise set in, accelerating towards the end of the year, when native maize at Kisumu and Thika was selling at Sh. 9/80 per bag. The pay-out by the Kenya Farmers' Association for the 1935-36 crop was Sh. 4/42 per bag, f.o.r. grower's station.

The possibility that local prices would be unduly depressed by a surplus of unexportable native-grown maize focussed attention on the system of marketing of native maize. It appeared that the maize was sold in inferior condition and that it passed through trade channels in which there was no organization for export. Inspection services were therefore tightened up, and Africans were encouraged to bulk their small lots and sell through agents appointed by their Local Native Councils. The Kenya Farmers' Association were appointed agents at certain points. The result of these measures was that 58,700 bags of native-grown maize were consigned direct for grading at the Coast, and 13,538 bags were consigned to the conditioning plant. Of the former, 24,565 bags, or 41.8 per cent, were graded; 22,375, or 38.1 per cent, being classed as K.3 S.W. or higher; the remaining 34,135 bags were mainly consigned in unsuitable bags or short in weight, and after attention over 33,000 bags were eventually passed for export. The results were thus satisfactory in essential respects, and indicate that native-grown maize can now be exported on equal terms with European-grown.

The maize export industry was assisted by a temporary rebate of Sh. 5 per ton made by the Railway Authorities in respect of maize railed for export between 1st December, 1935, and 30th November, 1936. At the same time, branch line charges and port surcharges were abolished.

Towards the end of the year the prospect of a partial failure of the short-rains crop in the Central Province caused local prices to rise appreciably above export parity. As the bulk of the European-grown crop had already been sold forward, this could not act as a stabilizing factor.

Wet weather was experienced during the harvesting of the 1935-36 crop, and the condition of the maize presented for grading was unusually bad. The position is indicated in the accompanying table:—

STATEMENT OF MAIZE PRESENTED DIRECT FOR GRADING

Year	Total Received	Graded		Rejected				Percentage of Total		
		Slightly Weevily	Total	Weevily	Wet and Musty	Other Causes	Total	Slightly Weevily	Weevily	Wet and Musty
	Bags	*Bags*	*Bags*	*Bags.*	*Bags*	*Bags*	*Bags*			
1936	837,098	157,073	680,056	64,859	73,186	18,997	157,042	18·8	7·7	8·7
1935	579,447	55,906	559,792	7,473	11,204	978	19,655	9·7	1·3	1·9
1934	205,826	30,347	197,324	4,325	1,686	2,491	8,502	14·8	2·1	0·8
1933	458,775	80,457	411,974	1,195	41,719	3,887	46,801	17·5	0·3	0·9
1932	289,503	62,229	250,007	7,711	25,814	5,971	39,496	21·5	2·7	8·9

Of the rejected maize, 70,000 bags were exported after treatment at the conditioning plant.

Wheat

The 1935-36 crop realized 151,305 bags of wheat for sale, in addition to an unknown quantity retained on farms.

The incidence of rust was unusually severe. The yield was heavily reduced, and a large proportion was of low grade.

Sales of wheat to mills during the year ended 31st August, 1936, amounted to 140,240 bags. Local sales for other purposes amounted to 5,383 bags, and 24,822 bags of low grade wheat were exported. The surplus of sales over the 1934-35 crop is accounted for by reduction of stocks on hand.

The prices paid to producers for the various grades were as follows:—

Grade.	*Per bag.*
1	Sh. 15/18
2	Sh. 14/68
3	Sh. 14/18
4	Sh. 13/68
5	Sh. 13/18
6	Sh. 12/68
7	Sh. 10/18
8/9	Sh. 9/18
10/11	Sh. 8/18
12/14	Sh. 7/18

The over-all pool price received by farmers was Sh. 13/33 per bag.

Sisal

The overseas market remained steady throughout the year, and the rise of prices of fibre in 1935 was fully maintained. An appreciable rise occurred in the value of tow.

The increase of production during the last three years or so had not been accompanied by corresponding new planting. In consequence, the output of fibre in 1936 did not much exceed the 1935 figure. Exports of fibre and tow during 1936 amounted to 34,746 tons, as compared with 32,136 tons in 1935. The value, however, increased to £690,459 from £423,112 in the preceding year.

Tea

The tea industry has now passed the initial levelopment period and is rapidly attaining a position among the leading industries of the Colony. In 1931, the export of tea amounted to only 3,158 cwt.; by 1936 this had increased to 67,099 cwt., valued at £335,690.

The area under tea again increased slightly under the International Restriction Scheme, and at the end of 1936 amounted to 13,176 acres.

Production of prepared tea (receipts into stockroom) during the agricultural census year, March, 1936, to February, 1937, inclusive, totalled 9,043,124 lb., as compared with 6,777,154 lb. in the preceding year.

London prices remained fairly steady during the year, though the undertone of the market was firm. An appreciable rise has occurred in the new year.

Sugar

The production of refined sugar during the period 1st March, 1936, to 28th February, 1937, was 315,660 cwt., as compared with 258,453 cwt. in the preceding year.

Exports of sugar (raw and crystallized) during the calendar year amounted to 131,904 cwt., as compared with 86,055 cwt. in 1935. The corresponding values were £76,301 and £52,976.

The reduction in the wholesale and retail price of sugar locally, noted in the last Annual Report, has continued in force up to the present time. It is too early as yet accurately to estimate the effect on consumption, as at first there was a

tendency towards accumulation of stocks. Allowance must also be made for the effect of increase of general prosperity and of incomes on consumption. The apparent consumption of sugar in Kenya during recent crop years has been approximately as follows:—

1932-33	...	...	...	9.1 thousand tons
1933-34	...	...	...	7.6 thousand tons
1934-35	...	...	...	8.6 thousand tons
1935-36	...	...	...	13.1 thousand tons

Wattle Bark and Extract

The market for wattle bark and extract has improved in the last two or three years, partly in consequence of improving world conditions and partly as a result of the efforts of the Department to improve the marketing organization. The difference between prices of Kenya and South African bark, formerly as high as £2 per ton, has now been reduced to an almost negligible point.

Wattle bark belongs to a class of commodities the prices of which have been described in recent economic literature as "administratively set". Its price does not fluctuate with the day-to-day variations of supply and demand. The price at Thika rose in January to Sh. 54 per ton for dry bark, as compared with Sh. 45 in December and Sh. 36 at the beginning of 1935. It remained at that level until June, when it fell again to Sh. 45, remaining at this point until the end of the year. It is believed that the rise in price in the earlier part of the year was due to competition between rival local firms who later came to an understanding.

Production continues to increase steadily. The timber and thinnings have so many uses, and the tree plays such a valuable part in the rotational system that the bark might almost be regarded as a by-product.

Conversion into extract continues to increase. The exports of bark and extract during 1936, as compared with 1935, are given in the following table:—

Wattle Bark—			*Cwt.*		£
1935	...	...	223,138	...	44,570
1936	...	...	240,914	...	48,747

Wattle Extract—	*Cwt.*	*£*
1935	101,888 ...	58,992
1936	110,272 ...	64,298

Pyrethrum

The pyrethrum industry has made rapid strides, in spite of a temporary depression of the market. The price of Kenya flowers at the beginning of 1936 was as low as £42 per ton c.i.f., but by the end of the year it had reached £68.

Exports were recorded separately for the first time in 1936, and amounted to 20,798 cwt., valued at £47,905. The marketing of the product is in the hands of the Pyrethrum Growers' Association. The Association has succeeded in maintaining a high premium over competitive growths. This is being largely achieved through the work of the Senior Agricultural Chemist, which is leading to sales on a guaranteed pyrethrin content.

Cotton

In the Nyanza Province, picking of the 1935-36 crop was retarded by heavy rain in January and February. An appreciable advance in production occurred, particularly in South Kavirondo. On the Coast also progress was made, but the condition of the seed cotton obtained left much to be desired. The final out-turn in the Central Province was 223 bales of lint.

The total crop for the Colony in the 1935-36 season amounted to 16,165 bales of 400 lb.

The weather in the 1936-37 season has been favourable in Nyanza Province, but drought has affected the prospects to a serious extent on the Coast and in parts of the Central Province. In spite of this, the total yield is expected to approximate 22,000 bales.

Prices paid for the 1935-36 crop were low, ranging about 10 cents per lb. for first quality seed cotton. The 1936-37 season opened more favourably, with prices around 13 cents per lb. for first quality at ginneries, increasing later to 14 cents.

New ginneries are in operation at Rangala in the Nyanza Province, at Lamu in the Coast Province, and at Sagana in the Central Province.

Production in Kenya during the last five seasons:—

Season and Province	Seed Cotton Purchased			Lint Ginned		
	First Quality	Second Quality	Total	1st Quality	2nd Quality	Total
	lb.	*lb.*	*lb.*	Bales *400 lb.*	Bales *400 lb.*	Bales *400 lb*
1935–36						
Central	128,633	138,578	267,211	112	111	223
Coast	3,823,252	1,353,896	5,177,148	2,958	1,154	4,112
Nyanza	13,500,039	2,275,864	15,775,903	10,130	1,700	11,830
Total	17,451,924	3,768,338	21,220,262	13,200	2,965	16,165
1934–35						
Central	..	..	..	..	..	..
Coast	872,107	1,312,205	2,184,312	667	901	1,568
Nyanza	8,228,163	1,225,316	9,453,479	6,325	881	7,206
Total	9,100,270	2,537,521	11,637,791	6,992	1,782	8,774
1933–34						
Central	..	..	..	..	..	..
Coast	1,034,709	414,510	1,449,219	779	280	1,059
Nyanza	6,280,615	575,767	6,856,382	5,256	435	5,691
Total	7,315,324	990,277	8,305,601	6,035	715	6,750
1932–33						
Central	..	..	..	..	..	..
Coast	1,229,494	199,826	1,429,320	892	165	1,057
Nyanza	3,748,015	406,776	4,154,791	2,880	340	3,220
Total	4,977,509	606,602	5,584,111	3,772	505	4,277
1931–32						
Central	..	..	..	..	..	..
Coast	570,946	56,940	627,886	435	43	478
Nyanza	1,735,572	383,942	2,119,514	1,256	1	1,257
Total	2,306,518	440,882	2,747,400	1,691	44	1,735

Note.—The Machakos–Kitui crop for 1935–36 is, for the sake of convenience, taken to be that harvested in 1935, though this was actually planted during the latter part of 1934. The figures for the Central Province should be interpreted accordingly.

Other Agricultural Produce

Other agricultural products include fruit and vegetables, essential oils, passion fruit juice, and cashew nuts.

Experiments are being made with ramie fibre and with flax of improved varieties.

Animals and Animal Produce

The year 1936 was rather patchy from the stockowner's point of view. Useful rain fell in the first two months of the year, when hot, dry conditions are usually expected. The long rains ceased early, however, and a long dry period set in, broken by inadequate precipitation in the short rains. By the end of the year the situation was becoming serious in some areas.

Butter

A fifth constituent member of the Kenya Co-operative Creamery organization is now in existence at Molo. The production of butter by this organization and its affiliates increased to 2,955,708 lb. during the period 1st March, 1936, to 28th February, 1937, as compared with 2,483,944 lb. in the preceding period.

The Butter Levy Ordinance was continued in operation during the year. The quantity of butter sold locally and the assistance provided by local sales to exports were as follows:

Year	Quantity of Butter on which Levy was Received	Subsidy on Butter Exported
	lb.	*Cts. per lb.*
1936	585,067	5·250
1935	586,920	8·386
1934	662,913	15·319
1933	606,285	20·665

London prices of butter fluctuated widely during the year, but in general have shown an upward tendency since the end of 1933. The pay-out made by the Kenya Co-operative Creamery Ltd. for first grade butterfat fell as low as 63 cents per lb. in February, 1936, but recovered in May to 74 cents, and stood at 77 cents in December. The general level was well above that of the preceding year.

Exports of butter during 1936 rose to 24,983 cwt., valued at £96,564. These figures compared with 16,287 cwt., and £59,652 in 1935.

The economics of the dairy industry were reviewed during 1935 by the Dairy Industry Inquiry Committee, which formulated a scheme for compulsory pooling of the proceeds of dairy produce of all kinds (except ghee). In view of opposition to the scheme in some quarters, the matter was

referred to the Standing Board of Economic Development. At the end of the year no decision had been reached on the matter.

Hides and Skins

The quantity of hides exported showed a considerable decrease in spite of the more attractive prices realized on the overseas market. This was no doubt due mainly to the favourable grazing conditions following a period of heavy stock mortality. The fall occurred mainly in sun-dried descriptions, the value of shade-dried actually showing an increase. The quantity and value of sheep and goat skins exported showed a pronounced increase.

The relative particulars are as follows:—

Hides, Sun-dried—	*Cwt.*	*£*
1935	54,340 ...	86,111
1936	28,317 ...	57,944

Hides, Shade-dried—	*Cwt.*	*£*
1935	26,344 ...	57,427
1936	24,145 ...	65,536

Skins, Sheep and Goat No. 1—	*Cwt.*	*£*
1935	1,190,251 ...	35,849
1936	1,794,060 ...	67,137

Wool

Exports of wool during 1936 amounted to 13,026 centals, valued at £44,174, as compared with 12,626 centals, valued at £41,710, in 1935.

The top prices realized for Kenya wools at the various series of London sales were as follows:—

1st Series	12¾d. per lb.
2nd Series	14d. per lb.
3rd Series	14½d. per lb.
4th Series	13½d. per lb.
5th Series	14½d. per lb.
6th Series	19d. per lb.

Other Animal Products

Other animal products produced in the Colony include milk, cheese, ghee, poultry and eggs, and rabbit wool.

Board of Agriculture

The Board held two meetings during the year, on the 29th and 30th January, and the 10th November. The Plant Industry Standing Committee met on the 9th November and the Animal Industry Standing Committee on the same day. The Maize Inquiry Committee met on the 12th June.

The Board had the opportunity of meeting Sir Alan Pim in the course of his investigations.

Matters discussed by the Board and Committees included consideration of the Report of the Dairy Industry Inquiry Committee, the Maize Export Quota Scheme, preparation of ramie fibre and of unretted flax, decortication of cotton seed, consideration of the recommendations of Sir Alan Pim with regard to the reorganization of the Agricultural Department and related matters, railway rates on fertilizers, etc.

Royal Agricultural and Horticultural Society of Kenya

The Society has been honoured by the patronage of H.M. King George VI and H.R.H. the Duke of Windsor.

The activities of the Society included the holding of a successful agricultural show at Nakuru in June and a limited show, confined to coffee, poultry, dogs and gymkhana events at Nairobi in December. A maize seed competition was held again in 1936 in collaboration with the Department. Farmers' Days were held at Nanyuki, Nakuru, Eldoret, and Kitale; the attendance was generally satisfactory, and a valuable opportunity for dissemination of agricultural information by members of the Department was afforded. In November the Society inaugurated a series of broadcast talks to farmers, with the generous co-operation of Messrs. Cable & Wireless Limited. Contributions are being made both by members of the Department and by practical farmers, and it is believed that the talks are widely appreciated. Work on the Stud Book continues to increase. Government has increased its grant in aid of the Society to provide for a reduction in the charges to farmers participating in the Society's milk recording scheme. Arrangements were made for live stock sales at Nakuru, but owing to the fact that farmers were finding no difficulty in selling their stock by private treaty the support was disappointing, and the scheme was abandoned.

H. B. WATERS,
Director of Agriculture.

Part II.--Work of the Department of Agriculture

DIVISION OF PLANT INDUSTRY

EUROPEAN AREAS

Extension Work

The investigational work which is being carried out continually by officers of the Plant Industry Division is, as far as possible, made available to agriculturists of the country by the publication of articles in the Press, by the issue of bulletins and pamphlets and by contributions made to the *East African Agricultural Journal*. Although the value of this publication service is realized and appreciated by farmers, the full practical application of this investigational work might not attain full significance without officers of the Division keeping in close personal contact with farmers on such occasions as farmers' days, and at their farms, where the work can be fully explained and practical demonstrations given.

A considerable proportion of this practical investigational work is carried out on private estates by the farmers themselves in collaboration with officers of the Department, and I should like to thank these farmers for the valuable help they have given.

The importance of mixed farming is being continually stressed by the extension and other members of the staff, and although most farmers realize the benefit and soundness of this agricultural policy, the progress which development is making in this direction is slow. The recent economic depression may have prevented "one-line" farmers from changing their policy with greater rapidity, but, in addition, a change in a system of farming necessarily presents new difficulties which are having to be surmounted. In order therefore to give farmers practical assistance and to accelerate this change in the farming system throughout the greater part of the country, a "mixed farming team" was formed of officers from the various sections, which visited the Nakuru, Kitale, Eldoret, Nanyuki, Songhor, Sotik and Kipkarren areas. In these areas meetings were attended and visits were paid to numerous farms in order to discuss local problems, to make observations on the local conditions, and then to suggest ways and means of overcoming difficulties, with a view to developing sound systems of mixed farming.

In addition to this mixed farming campaign, specialist and other officers have paid visits to many parts of the country. During the year the Senior Coffee Officer toured the coffee areas and gave demonstrations on various aspects of coffee culture.

The Senior Plant Pathologist continued in charge of the investigations for control of coffee diseases in the western districts. He addressed planters' meetings on coffee diseases at Sotik, Songhor and Nandi. Mr. C. H. Thorold, Plant Pathologist, who was stationed on Mount Elgon and mainly engaged in investigations on Elgon dieback of coffee, and to a less extent on coffee berry disease, attended a number of committee meetings of the Trans Nzoia Planters' Association. He also attended coffee planters' field days held on estates on Mount Elgon and at Endebess, Turbo, and at the Department's plots at Kitale.

Lectures dealing with grassland problems were given by the Officer in Charge of Grassland Improvement during the year at Nanyuki, Kitale and Eldoret.

Mr. Wilkinson, Entomologist in Charge, was stationed at the Scott Agricultural Laboratories on his return from leave on 28th June. During his absence the work of the Entomological Section was carried out by Mr. F. B. Notley, Entomologist, who later in the year (on the 31st October) left the Department on transfer to the Tanganyika Government. I should like to place on record my appreciation of Mr. Notley's services during the six years he was in this Department.

Dr. Le Pelley, Entomologist, was absent throughout the year. He was in America until June, on his Commonwealth Fund Scholarship, after which he proceeded to Hawaii, Japan and the Philippine Islands to search for parasites of the Kenya coffee mealy bug on a grant made from the Colonial Development Fund.

The Agricultural Officer, Njoro, gave twelve lectures to various farmers' associations during the year, and in addition visited 284 farms, where advice on problems relating to general agriculture and animal husbandry was given. The Agricultural Officer, Kitale, in addition to attending farmers' meetings at Turbo, Moiben, and Kitale, visited 122 farms.

The annual Coffee Planters' Days were held in Nairobi on the 23rd and 24th of September. On the morning of the first day, three papers dealing with investigational work on coffee were read by officers of the Division. Mr. R. Barnes

read a paper on "The Prevention of Soil Erosion on Coffee Estates and Farms," and a paper by Dr. G. B. Wallace, Plant Pathologist, Tanganyika, on "A Disease of Coffee Associated with Cold in Tanganyika," was read by Mr. J. H. McDonald, Senior Plant Pathologist, Kenya. In the afternoon planters visited the Scott Agricultural Laboratories. Commercial firms were visited on the morning of the second day, while in the afternoon a field demonstration took place, by courtesy of Messrs. E.A. Coffee Plantations Ltd., on Kiamara Estate, Kiambu.

On the 25th September the Kenya Coffee Conference was held in the Memorial Hall, Nairobi, under the chairmanship of Mr. R. S. Wollen.

Nakuru Show

The Agricultural Show was held at Nakuru on the 3rd and 4th of June, at which officers of the Division acted as judges of various classes. Comprehensive educational and demonstrational exhibits were staged, including two miniature plots each representing a 400-acre farm under extensive and intensive cultivation respectively—the former showing soil erosion on cultivated lands and unprotected river banks, etc.; the latter demonstrating a model mixed farm. Native agriculture was excellently represented, while the grassland section was chiefly devoted to exhibits of Rhodes grass, which is attracting a great deal of attention in the Colony, and the more successful leguminous plants for mixtures. These exhibits were greatly appreciated, and the concensus of opinion was that they were the finest ever staged by the Division.

Investigational Work

As explained in my last year's Report, a considerable amount of investigational work is carried out at the Scott Agricultural Laboratories and at the Plant Breeding Station, Njoro. In addition, the Agricultural Officer, Njoro, and the Agricultural Officer, Kitale, devote a good deal of their time to field experimental work, and, by means of co-operative experiments with farmers, investigate local problems and improvement of crop production. The work of the Officer in Charge of Grassland Improvement is centred at Kabete.

The reports of officers of the Botanical, Plant Breeding, Chemical and Entomological Sections will be found printed in full in Volume II of the Department's Report. The report of the Senior Coffee Officer is being published in the May (1937) number of the *East African Agricultural Journal*,

while reports on the investigational work on crops and pastures carried out in the Trans Nzoia, Molo and Rift Valley areas are being published in the Press and the *East African Agricultural Journal*.

Coffee

Although the annual rainfall was somewhat above average, the distribution was exceedingly bad, and consequently had a definite adverse effect, not only on the trees, but on the yields and quality of the coffee produced.

Monthly Pruning Experiment

This experiment has again been continued, the object of which is to enable observations to be made on the influence of pruning in relation to the amount and time of flowering and the yields of the resultant crop. Results have again shown that pruning has a considerable influence on the time of flowering; thus, trees pruned in October, November and December produced their main flowering in the short rains of the succeeding year, while trees pruned in February, March and April produced their main flowering in the long rains. The experiments are now sufficiently advanced in their cycle to enable initial crop weights and liquoring tests to be made, but records covering a period of years will be necessary before significant results can be obtained.

Pruning and Management

The importance of judicious "handling" of bushes established on the single stem system has been clearly demonstrated by experimentation during the year; and the necessity of allowing trees in a state of debility to recover fully before pruning is attempted must again be impressed upon planters.

The multiple stem system has been strongly advocated, and the principles of pruning under this system have already been brought to the notice of planters in numerous bulletins, lectures and demonstrations; further reference is not necessary in this report.

At the Scott Agricultural Laboratories the multiple stem plots have been consistently better than the single stem plots, and although the former carried a crop in the vicinity of one ton per acre the bushes showed no distress, while the bushes in the latter in carrying an equivalent or lesser crop were in a debilitated condition at the end of the season. Comparative liquoring tests carried out between coffee grown on multiple and the same variety grown on single stem systems gave a slight variation in favour of the multiple stem.

Bordeaux Spray

The results obtained by spraying with Bordeaux mixture have again been outstanding. Increases of 100 per cent in yield have been obtained over a period of three years by the use of this spray.

It must be pointed out, however, that, while the results are fairly conclusive, unless the soil and trees are in a condition to justify the operation results may be disappointing.

Coffee Varieties

"Harar" again stood up to the drought conditions well, and the new Abyssinian variety, "Amfillo," was planted out into the field during the year. Yet another variety from Abyssinia, "Geisha," has been received and planted in the nursery beds. Germination has been good.

Mulching

Observations throughout the year once again show most beneficial results from mulching, and planters in the *drier* districts are strongly advised to grow sufficient Napier grass for their needs, even although this may mean the sacrificing of a small area of coffee.

Shade

Trials of shade trees and shade regulation on estates have been continued. Owing to lack of supervisory staff in the past this important question has not received the full attention it deserves, but with the reorganization of the coffee services it is hoped to give the matter greater prominence in the future.

Quality

Work on the "quality" as affected by factory management has been carried out with a view to investigating the alleged injurious taint imparted to liquor due to coffee being brought into prolonged contact with metallic substances and the deleterious effect of fermenting in new cement tanks where lime is present in the form of calcium carbonate. Results have been inconclusive, although there are indications that lime lengthens the fermentation period, and when present in comparatively large quantities produces a definite "unclean" taint.

Special investigations were made at the Scott Agricultural Laboratories in connexion with the presence of a distinctive greenish tinge in parchment coffee, imparting a decided taint to the liquor. Up to the present time it has not been possible to trace the cause of the coloration.

It is interesting to note that evidence has been forthcoming which shows that coffee planted on old *boma* and hut sites produces a crop which has a distasteful liquor. In extreme cases it is advisable to abandon the areas and plant them with Napier grass.

Vegetative Propagation of Coffee

With the appointment of a trained horticulturist, it has been possible to devote more time to this work. Progress was made during the year with vegetative propagation, special attention being paid to grafting in the field on old stock. In the experiment being conducted on the influence of the stock it was found that *C. eugenioides,* used as a root stock, has a dwarfing effect on growth combined with early cropping. The crop harvested from clonal material proved remarkable for evenness in size and shape of bean.

Coffee Berry Disease

Considerable experimental work was carried out at the Coffee Berry Disease Experiment Station, Sotik, but in a few instances, owing to the damage caused by phenomenal hailstorms in February, no observations could be made in 1936. Many additions were made to the plots devoted to varietal resistance studies and to those devoted to the production, by means of vegetative propagation, of combinations of rootstocks and scions suited to local conditions for testing resistance to berry disease.

Various chemical soil treatments failed to exert any appreciable control over the disease; but spraying with one per cent Bordeaux mixture in January, May and July very considerably reduced losses from it.

Elgon Dieback

The investigations on "Elgon dieback" in the Trans Nzoia have tended to confirm the view that this trouble is merely a particular form of "hot and cold" disease. Observations were carried out in an attempt to discover the relationship between severity of the disease and particular climatic conditions. It was not found possible, however, to correlate the more severe occurrences of dieback with any particular set of climatic conditions. It is thought that susceptibility depends on a particular physiological condition of individual trees or shoots, even when climatic factors favour the occurrence of the disease.

Further demonstrations indicate that there are types or varieties of coffee which are highly resistant to the disease, and that shade has a beneficial effect in reducing the incidence.

Mealy Bug (Pseudococcus kenyae).

A large proportion of the time of the Entomological Section is being devoted to the control of this insect, which is the most serious pest of coffee in Kenya. It is still considered that the most successful form of control lies in the introduction of suitable predators and parasites. A grant of £1,400 was made from the Colonial Development Fund for this work. A quarantine laboratory was erected at the Scott Agricultural Laboratories for the reception and breeding of parasites and predators received from other countries. In October and November four consignments of *Pseudococcus lilacinus* Ckll., parasitized by *Pseudophyeus* sp. and *Anagyrus* sp., were received from Dr. Le Pelley, who was then working in the Philippine Islands. Some twenty-five speciments of *Anagyrus* and 3,300 specimens of *Pseudophyeus* emerged alive from the mealy bugs, and were utilized in sixty experiments in an endeavour to provide suitable conditions for oviposition in *P. kenyae*. These experiments entailed very careful and patient work, but in spite of this in no single experiment was oviposition observed in *P. kenyae,* although this mealy bug, until 1935, was considered to be *P. lilacinus*.

Work on a predatorial Cecidomyid from Uganda has been continued, and it is promising to be a very useful addition to the indigenous predators, especially during the warmer periods of the year.

Experiments on the work of grease and other banding have been carried out during the year, including that on an entirely new type of band evolved by a coffee planter. This consists of a collar of galvanized iron placed round the stem of the tree and filled with murram of different grades, and a band of creosote or a mixture of grease and creosote placed round the outside of the metal collar. This method has yet to be fully proved, but indications to date are favourable, and if successful its advantages will be many.

Antestia and Capsid Bug

A suitable technique has been evolved during the year for dusting coffee trees with pyrethrum powder. This has now become the accepted method for the control of Antestia and Lygus. The cost of application is from Sh. 5 to Sh. 7 per acre, which is roughly half that of spraying with pyrethrum extract.

Stephanoderes

As a result of investigations it has been shown that *Stephanoderes* cannot survive in coffee which has a moisture content not greater than 12.5 per cent, and it would now appear that ex-territorial coffee with a moisture content not exceeding 12.5 per cent could be allowed to enter the Nairobi market with safety.

Coffee Team

A team of full-time workers on coffee is being formed, to commence operations in 1937, under the leadership of the Senior Plant Breeder, Mr. G. J. L. Burton. This follows from the recommendation in Sir Alan Pim's Report.

Maize

The Plant Breeder and the Agricultural Officers at Njoro and Kitale have continued the breeding and cultural investigations designed to improve the yield of maize; while at the Scott Agricultural Laboratories the work of selection and bulking "Muratha" maize, for issue to native reserves requiring an early maturing and good yielding variety, has proceeded satisfactorily.

Maize Breeding

At Kitale and Njoro an attempt is being made to evolve strains of good-yielding maize resistant to White Blight (*Helminthosporium turcicum*), Ear and Foot Rots (*Fusarium* sp.), and Rust (*Puccinia sorghi*). Some 1,270 self- and cross-pollinations were carried out at Kitale in 1935, and during the year under review the work reached an interesting stage with the double crossing of selected single crosses. It is felt that a considerable measure of resistance to White Blight has been obtained, but at present there is little indication that any progress has been made towards obtaining Pink Ear Rot resistant strains.

At Njoro also satisfactory results in the production of a high-yielding maize suitable for the high-altitude maize-growing areas are becoming evident. The inbred lines are becoming fixed in type, and a number of single and double crosses have been made and some unusually high yields obtained in the first season.

Muratha Maize

The Muratha maize mass selection work was continued at the Scott Agricultural Laboratories. Rust was very prevalent during the year, and made selection of plants, for resistance to White Blight and Ear and Foot Rots, difficult. There was, however, a definite improvement in resistance to *Fusarium* and White Blight.

In addition to the special selections which were made and which will be planted at Kabete in 1937, twenty bags of selected seed were issued to the Provincial Agricultural Officer, Central Province, for distribution.

Maize Seed Competitions

Under the auspices and with the help of the Royal Agricultural and Horticultural Society of Kenya, the Department again carried out maize seed competitions. This statistical test of the quality of seed was made at Kitale, Njoro, and Crater Stream, the entries in each area being 16, 18, and 22 respectively. At Kitale, where the trial was carried out on the Elgon type of soil, it was found that the best results were obtained from maize which came from the poorer sandy soils. Two lots of Experimental Station maize were entered, one of which had been most carefully hand-picked, and this came out first, equal with another entrant, in the yield test, while at the same time showing the lowest percentage of diseased cobs. Heavy yields were obtained at Njoro and Crater Stream centres; at the former there was a difference of 38 per cent in yield between the highest and lowest competitors, while at the latter centre the difference was 21 per cent. This demonstrates very clearly the value of careful seed selection, and in addition indicates the value of these competitions to the maize industry. The results of these competitions have already been published in the Press.

Head Smut (Sorosporium reilianum)

In order to ascertain any correlation which may exist between time of planting and incidence of smut on the maize crop, a statistical experiment was made at Njoro on a piece of land known to have been severely infested with smut in 1935. As heavy rains were experienced before the earliest planting, it is probable that many smut pores germinated and died, thus leaving a poor soil infection prior to the first planting.

Results

Date planted	Yield per acre	Per cent Smutted cobs	Per cent Smutted tassels
	Bags		
21–2–36	16·0	0	3
16–3–36	13·6	4·6	1·2
17–4–36	5·9	2·5	1·2

The results of the experiment speak for themselves, and tend to emphasize the importance of planting maize in the area at the very earliest opportunity.

Maize Stalk Borer (Busseola fusca).

Owing in the main to locust invasion and economic depression, stalk borer control measures in the Nakuru district have lapsed in recent years. The advisability of reintroducing control measures was discussed, and the matter was brought before the general meeting of the Kenya Farmers' Association on 28th November. It was decided at this meeting that the Stalk Borer Rules should be enforced, and action was taken accordingly. A plantation inspector has been posted at Nakuru to supervise the campaign, but an inadequate number of honorary inspectors have been appointed by the various farmers' associations concerned.

Green Manuring Experiment

An experiment at Ngata, designed to test the effects of ploughing in of crop residues, such as wheat and barley straw, against green manuring (sunflower planted early followed by New Zealand grass pea and ploughed in), showed the beneficial effect of ploughing in wheat and barley straw on the yield of maize. Taking the control plots (maize after maize) at 100 per cent, the yields on the "maize after wheat straw ploughed in" treatment and "maize after barley straw ploughed in" were 149.2 per cent and 148.5 per cent respectively, while the yield of maize from the green manure treatment was 117.8 per cent. Included in the experiment were trials on the correct time of the ploughing in of the straws. The results of this last were not very definite, as they could not be subjected to statistical interpretation, but the indications were that early ploughing in of straw is desirable.

At Rongai, an experiment to determine the effect of ploughing in barley and wheat straw on the subsequent maize crop showed that the maize after ploughing in of wheat straw gave a significantly higher yield over maize after maize, the actual yields in bags per acre being 11.21 bags and 9.20 bags respectively. An experiment, continued from 1935, to test the effect of the ploughing in of pumpkins interplanted in maize the preceding year, failed to give significant results.

The latin square green manure rotation experiments at Messrs. Barnes Bros., Hoey's Bridge, and on Capt. L. A. Elmer's farm at Kitale, have not been continued, but a series of randomized block experiments has been commenced on the farm of Mr. G. C. A. More.

A green manure rotation experiment has also been in progress on Mr. More's farm since 1934-35, the following treatments being used:—

Treatment.	*Ploughed.*	*Yield of maize per acre.*
1. Control—Maize alone	— ...	11.24 bags
2. Sunflowers followed by lupins ...	1934 ...	14.92 bags
3. Sunflowers followed by lupins ...	1935 ...	16.41 bags
4. Weeds followed by lupins ...	1934 ...	17.83 bags
5. Weeds followed by lupins ...	1935 ...	15.42 bags
6. Weeds followed by velvet beans	1935 ...	14.72 bags

The weeds and sunflowers were dug in in July, 1934, and the lupins in treatments 2 and 4 were dug in in November, 1934. The maize was planted in April, 1935, the land having been ploughed in early March. Results showed that all treatments gave significant increases over the control, and that there were no significant differences between the treatments themselves. In 1936 the plots were again planted with a view to testing the residual effect of the green manuring, and it was found that, with the exception of treatment 4, there was no significant increase over the control; and that, with the exception of the control, there was a general decrease of about two bags per acre as compared with the previous year. Some of the plots reverted in the one year to the level of the continuous maize land.

Exceedingly interesting results were obtained from an experiment using different treatments to determine the effect of the application of lime with and without humus on the subsequent maize crop. The only two treatments which showed a significant increase over the control were those with compost. While the control plots gave a yield of 14.62 bags per acre, the plots which received four tons of compost per acre applied before planting gave a yield of 19.59 bags per acre, and the plots which received two tons lime plus four tons of compost per acre gave a yield of 18.85 bags per acre. The value of compost was also demonstrated in an experiment embodying the application of phosphate fertilizers with and without lime and humus. While the compost treatment gave an increase of approximately fifty per cent over the control (18.96 bags per acre as compared with 12.48 bags per acre), the artificial fertilizers appeared to have no beneficial effect.

It should be pointed out that the compost used in these experiments was fairly fresh *boma* manure made from Napier fodder well trampled in a small night *boma*. The land on which the composting experiment was carried out at Rongai in 1935 was again planted with maize in 1936 in order to observe the residual effects of the compost. The yield of maize from the plots which received 8½ tons of compost in 1935 was 16.71 bags per acre as compared with 13.84 bags per acre from the plots which received 3 tons, and 13.49 bags per acre from the control plots.

These experiments again demonstrate the beneficial effect which *boma* manure and compost has on maize lands, and does much to prove the value of mixed farming in the agricultural economy of the country.

Reversion of Maize Lands

A large-scale experiment has been laid down at Njoro River Farm on a five-acre field which has grown maize continuously for a large number of years. The crop was a complete failure in 1935, due mainly to poverty of the soil and drought. The field has been fenced off into five one-acre blocks which have been treated as follows: (1) Control—continuous maize cropping; (2) Australian Rhodes grass and lucerne mixture sown down; (3) planted star grass runners and sown down with Australian Rhodes grass; (4) natural reversion, cut and grazed; (5) natural reversion—no cutting or grazing. It is proposed to keep the plots under these treatments for at least three years before being ploughed up to test the rejuvenation.

From observations made it appears that in the case of natural reversion the grass herbage develops more rapidly if no attempt is made to control the annual weeds by cutting in the first year, as these seem to act as a nurse crop for the grasses. It is interesting to note that hand weeding has been unnecessary in the establishment of the grass mixtures; the controlled cutting at intervals with the grass mower has proved adequate, and the cut material has been allowed to remain on the land.

Short Term Maize

Potchefstroom synthetic maize has been grown at Rongai during the year. No yield trials were possible owing to the necessity for keeping the seed pure. The plants proved drought-resistant, as they flowered during a very dry period, which the other maize in the district did not experience at the same stage; the yield was 7.21 bags per acre.

Wheat

A considerable increase in the acreage seeded to wheat in 1936 has to be recorded, due to a large extent to the issue of new wheats by the Department. The issue of 6,000 bags of strains of No. 112 was organized, while the other main varieties sown were Sabanero, Kenya Governor, Equator, and Burbank. Wheat has replaced maize to an appreciable extent in the maize-growing areas of the Rift Valley, where it is estimated that the increase in wheat acreage is 50 per cent. The estimated yield is 3½ bags per acre, while the grade is somewhat higher than normal. Rust was responsible for a varying amount of damage, physiologic form K2 being generally present, whilst form K4 was more local in appearance. This was the reverse of conditions experienced in 1935. A very bad infection of leaf rust was experienced.

Wheat No. N.B. 230 was almost entirely replaced by No. 112 at the higher altitudes, for which it was primarily bred. Owing, however, to its resistance to form K4 rust it was also grown at the lower altitudes of 7,000 to 6,000 feet, although it was not recommended at these elevations.

Wheat Breeding

The investigational work on wheat, mainly carried out by the Plant Breeder, is to a very large extent devoted to the breeding of rust-resistant varieties, and is conducted at the Scott Agricultural Laboratries, Kabete (5,700 feet), the Plant Breeding Station, Njoro (7,100 feet), and Marindas Farm, Molo (9,000 feet). The hybrid wheats previously grown at the Scott Agricultural Laboratories have now been moved to the Experimental Plots at Rongai, where they are within easy range of supervision from Njoro.

Rapid multiplication of Cross No. 112 has taken place, and as stated above 6,000 bags of various strains of this cross were issued at the beginning of the year. Some of these strains are only for temporary use until sufficient seed of the better strains is available. The behaviour of this cross grown on a large scale has been mixed, and the following points have emerged: It requires good land, and does not suit the poorer soils. Although it is very susceptible to leaf rust, it has not suffered from stem rust appreciably at the higher altitudes, though, as was expected, a few cases of severe damage have occurred at the lower altitudes for which it was not recommended. Its resistance to yellow rust has generally been satisfactory, and it is of course only susceptible to form K2

of stem rust to which it was exposed this year. Where conditions have been suitable, good yields have been obtained, but it is essentially a wheat for the high altitudes.

Two strains of this cross have been selected for further development, since they are better milling wheats, while a white-grained wheat out of one of these strains is in the course of being multiplied as it is a still better milling wheat and much less susceptible to stem rust.

Cross No. 58, which has now been grown by some 70 farmers, has given satisfaction throughout the country, and due to double multiplication, i.e. utilizing two seasons in the year, 3,000 bags should be available for sowing in 1937. This cross is suited to the lower altitudes up to 7,000 feet, and is as resistant to stem rust as any wheat growing in the country. It is an excellent yielder, though inclined to lodge on rich land.

A few strains of Cross No. 130 have been issued. It will be recollected that whilst these wheats were resistant to forms K3 and K4 of stem rust, some doubt was felt about their resistance to K2 in the field, and one of these strains has in fact shown slight susceptibility to this form, although no material damage was done. They have, however, in every case grown and yielded very well. A further series, which had shown increased resistance to this form, were grown under irrigation through the dry season, and were replanted in June, and have now reached the bag stage.

A collection of Australian x Kenya crosses was obtained from New South Wales, and some very promising types have been obtained which have an apparent resistance to leaf and stem rust. These should be suited to the lower altitude districts.

The baking quality of the new hybrids is in itself a big problem. Climatic conditions in Kenya are anything but constant, and they undoubtedly play a big part in the variation of analyses experienced from year to year on any particular variety. Many of the wheats are somewhat stable in character and under adverse conditions this stability is increased whilst the general strength figure tends to be lowered. Particular attention is being paid to this aspect of the problem in the newer crosses.

Take All

This disease was again of major importance at the higher altitudes, and in these areas nothing less than rigid adherence to the recommendations laid down for its eradication will

save farmers from heavy annual losses, and I must again repeat that the remedy is to rest infected land for at least two years from wheat, and to put it down to some crop which is not a carrier of the disease.

At Molo a long-term experiment has been laid down to devise a suitable rotation of arable crops on land badly infected with "Take All" in order to eradicate it, while at Messrs. Sayer Bros. farm the area being used for the Take All experiment was not planted to wheat in 1936 but allowed to remain down for a further period of one year. In 1937 it is intended to plant wheat in order to determine which of the grasses, both indigenous and exotic, are liable to transmit the disease.

The inability to replace a large area of wheat by some other suitable crop is a difficulty which is being fully investigated, and it is confidently hoped that the experiments at present being carried out will further the economic solution of this problem.

Plant Pathological Investigations

The Plant Pathological Section devoted considerable time on the work relative to the reaction of new hybrid selections of wheat to the various forms of stem rust.

The appearance of what was suspected of being a new physiologic form of stem rust was investigated during the year. The conclusion was reached that the new rust was merely a more virulent strain of the previously known form K4. Precautions were taken to prevent dissemination, and no further case has been discovered.

Cereals Other than Wheat

Investigational work connected with oats and barley is in the main confined to the testing of imported varieties and strains. Owing to the limited extent to which these cereals are grown in the Colony, it is felt that expenditure on breeding work is scarcely justifiable.

Oats

The variety "Lampton" again proved resistant to stem rust at Molo, and small issues have been made to farmers. Parker's naked oat rusted badly, and is unsuited to local conditions.

A further collection of hybrid oats, received from New South Wales, was grown at Molo, but with the exception of one or two Lampton hybrids these proved susceptible to rust.

Barley

A number of imported varieties, including smooth-awned strains, have been tried, but none have proved superior to "Chevalier" where a quick-maturing barley is required, and to "Archer" where a longer growing season is experienced.

SISAL

Work on the better preparation of sisal line fibre has been continued by the Chemical Section during the year. Commercial bales of sisal fibre decorticated with a normal and a low flow of water, and with and without subsequent centrifuge washing and drying, were submitted to the Director of the Linen Industry Research Association, Lambeg, for a report on the commercial quality of the fibres. It was found that, although the differences in the natural fineness of the fibre in the different bales tended to mask the various preparation methods, the thorough washing of the fibre in a centrifuge and partial drying somewhat reduced the rigidity of the fibre. It has been suspected that chemical changes in the fibre during the voyage were responsible for the development of harshness, but no evidence of this could be found.

PYRETHRUM

Important work, in collaboration with Dr. Gnadinger in the United States of America, was commenced by the Senior Agricultural Chemist during the year for investigating the extent of deterioration of pyrethrum during the voyage between Kenya and the United States of America. From initial tests it appears that with the careful grading and baling that is practised by the export agents under the marketing control scheme a pyrethrin content of 1.30 per cent could be guaranteed on arrival and as received, such a guarantee would have a great bearing on the obtaining of a premium substantially higher than that enjoyed by Kenya at the present time over the Japanese pyrethrum.

Pyrethrum Breeding

During the past year all the selected pyrethrum material was moved from the Plant Breeding Station, Njoro, to a farm in the district at the 8,000 feet level, as being more representative of the main pyrethrum growing area of the country. It is hoped that during 1937 periodic weighings of pickings from individual lines can be started. Many of the selected plants already appear to be superior to the ordinary pyrethrum farm crops as regards both number and size of flowers.

Spacing Experiments

At Njoro a pyrethrum spacing experiment (which was picked continuously throughout 1936) has shown that of the three spacings adopted, namely, 12 in. x 12 in., 18 in. x 18 in., and 24 in. x 24 in., the 18 in. x 18 in. spacing gave the highest yield, while a large percentage of the plants in the 12 in. x 12 in. plots failed to flower.

Manuring

The present results of manurial experiments, which embodied different treatments of organic and inorganic manures, indicate that the pyrethrum plant is genetically capable of a certain production throughout the year, and that the application of manures may alter the time time which this yield may be obtained although it may not affect the total yield unless any one of the manurial constituents is markedly absent.

Drying

A great deal of work has been done on pyrethrum this year, principally in connexion with the problems of drying and driers.

The crucial point in artificial drying (the maximum safe temperature) has been investigated. Up to 125° F. there is no loss of pyrethrins; at 130° F. there is a very small, negligible loss; above this temperature the loss increases rapidly with rising temperature. Driers therefore should not be run at a temperature exceeding 130° F. It was found that sun drying, especially if continued over several days, causes an appreciable loss.

The study of pyrethrum driers was continued during the year. This study was greatly facilitated by the residue of a grant from the Colonial Development Fund, to the administrators of which the Department is greatly obliged. As a result of the survey of the types in use, an improved system of stacking trays in the existing "oast house" types was evolved. An efficient and economical type of drier, the "Ainabkoi Drier", has been designed. This works on the through-draught, continuous flow principle. It is cheap to build, quick drying, has a large capacity for its size, and is economical to run. A full description has appeared in the *East African Agricultural Journal.*

During the course of laboratory experiments to study the principles of horizontal draught tunnel driers, it was discovered that if the preliminary stages of drying were rapid the

soft achenes of immature flowers tended to case-harden and did not dry properly. This shows that in batch driers the temperature must be kept down for a while after charging, and in continuous flow driers the flow must be against the air current.

Passion Fruit

Passion fruit has, in the past, only been grown on a minor scale in Kenya, but now that there appears to be an increasing demand for passion-fruit juice in Europe and America the planting of the crop has been rapidly increased with a view to entering this export market.

In 1933 samples of grenadilla juice were prepared at Kitale by the Department and sent to London, where they were reported upon very favourably by commercial firms. In 1935 the Kenya Farmers' Association commenced to handle the commercial side of this potential new industry, and sent two barrels of juice to London with very encouraging results. Since that time the acreage under the crop has been greatly extended, and in order to rationalize this young industry an Ordinance has now been brought into operation. It is essential that the industry should be organized and the preparation and marketing of the product centrally controlled, as the preparation of the juice is a technical procedure and to ensure success a standardized product must be exported with the warranty of quality which a brand conveys.

Pruning and Cultural Methods

At Kitale twenty rows of 10 plants each were planted during the year, with a view to experimenting with various pruning and cultural methods. The vines have made excellent growth, and will be trellised in the early months of 1937.

Diseases

Investigations have been carried out on a destructive collar rot occurring on a single estate in the Trans Nzoia. The trouble appeared to be closely associated with wet and cold conditions during the rains, and plants appeared to recover rapidly on the return of the dry weather. A fungus, which has not yet been identified, was frequently associated with the disease, but is believed to be doubtfully parasitic. Some success has been attained by removing the soil from the base of the stem to allow free circulation of air, cutting away lesions, and applying Bordeaux paste.

Miscellaneous Cash Crops

Flax and Linseed

The pedigree Irish flax varieties which were obtained through the Minister of Agriculture, Government of Northern Ireland, in 1935, and which were grown at Molo, Kitale, and Mount Elgon, were again subjected to trials and examinations during the past year. At Kitale and Endebess (Sabwani Estate) the results obtained were more or less in agreement with the observations made during the previous year, and again showed that while the Stormont varieties are later and longer in the straw than the Liral varieties, the latter are inclined to give a heavier yield of seed and a finer fibre. At Njoro it was found that the Stormont varieties gave a much greater yield of straw and fibre than the Liral varieties, while results from the Molo trial showed there was very little to choose between Stormont Gossamer, Stormont Cirrus and Liral Crown. Eventually Liral Crown was decided upon as the variety for bulk issue, and two tons of seed were procured by the Department for the Kenya Farmers' Association for distribution. Seed only is to be exported at present, for the Northern Irish flax-growers; purity and quality are controlled by inspection and germination tests under legislation. Meanwhile investigation is proceeding with the possibility of fibre production on a very much lower cost basis than in the earlier days of flax-growing in Kenya.

Diseases

The variety Liral Crown which is being grown through out the country has suffered considerably from rust (*Melampsora lini*), which, though not appreciably affecting the yield of seed, appears to cause frequent breaks in the fibre, and therefore, if fibre production is seriously undertaken, remedial measures may have to be given attention.

Ramie

The production of ramie fibre for export must still be regarded as in the experimental stage. The conditions in many parts are well suited to growth, but machine decortication at low cost remains the problem for European growers; for natives, hand decortication is suitable. Some forty Europeans have planted small areas of Ramie, and bulking of planting material has been taken in hand for certain native areas. Investigations are in hand for export of the fibre containing bast, uncleaned, and for various measures of removing the bast at low cost without machine decortication.

Beans

Work has continued at Njoro and Rongai on the selection of Canadian Wonder, Rose Coco and Madagascar butter beans for resistance to bacterial blight. On account of the heavy rainfall experienced, 1936 was an excellent year in which to test the selections, as the infection was severe throughout the year. Two crops of Canadian Wonder beans were obtained during the year, and owing to this more rapid multiplication the resistant selections are now available for issue.

The Rose Coco selections are still in the single plant stage, but if these prove resistant it is hoped to multiply them in 1937.

Results with Madagascar butter beans have been very disappointing at Njoro, and no resistant material has been obtained at this altitude, although a few plants survived when the majority were completely killed out by the disease. At Rongai more successful results are being obtained, and selection work on this strain will continue.

A sample of sword beans, grown on an estate in the Colony, was submitted to the Plant and Animal Products Department of the Imperial Institute, London, during the year in order to ascertain whether they would find a market in the United Kingdom. On analysis they were found to have the normal composition of sword beans (*Canavalia* sp.). Feeding trials carried out on a previous occasion at an agricultural college at the request of the Imperial Institute indicated that the beans were unpalatable to pigs, sheep and cattle, and difficulty was experienced in inducing animals to eat them. In any case, their value in the United Kingdom would not exceed £4 to £5 per ton c.i.f. Their production in Kenya for shipment would probably be unremunerative, and it was suggested by the Imperial Institute that feeding trials might be made in the Colony to ascertain whether a local market could be found for the crop. These trials are being carried out.

Peas

Field Peas

Yield trials of two field peas, P.B.I. and Canadian Wonder field pea, were carried out at Njoro and Molo, but at both centres there was no significant different in yield between the varieties, although the yields obtained at Molo were three times greater than the yields at Njoro. The P.B.I.

50 pea is some fourteen days earlier in maturing than the Canadian field pea, although it does not make the same amount of vegetative growth.

White Peas

The Large Victoria White pea and the Canadian White pea were compared at Njoro against the Dutch Marrowfat variety, with a view to determining yields. Although the results were not capable of statistical readings, they indicated that the white peas for the split pea trade gave superior yields to the Dutch Marrowfats, and since they require no special harvesting technique they will probably prove more suitable for the average farmer.

Harvesting

The most suitable methods for harvesting marrowfat peas in order to obtain an export sample of good colour have been tried out, and it has been show that, provided the whole plant is pulled when the bottom pods begin to yellow and placed in a maize crib to dry, an excellent export sample can be obtained with a minimum percentage of bleached peas.

Soya Beans

Trials of Soya bean varieties imported from Java have been carried out at Njoro and Kitale, and although results gained from this first year's experience of the imported varieties are not very encouraging, it is hoped that greater promise will be shown when the seed becomes acclimatized.

At Njoro the new introductions were tried against the older varieties in this country. The variety Busa appears to be the most promising, and superior to Dixie, a standard variety, which was used as a comparison and which suffered severely from bacterial blight. The varieties Kedelee 27 and 29 grew much too slowly for seeding, although they might be useful for green manures or cover crops. Kedelee 30, Slamat, and Greenish Yellow appear to be fairly resistant to blight, and are likely to prove superior to the other varieties.

At Kitale, also, Busa gave indications of being a good yielder, in comparison with the other varieties, and was also moderately early, maturing in about 180 days. Of the Kedelee strains, No. 30 was the best and the earliest to mature. The best growth of foliage was made by Kedelee Nos. 27, 29 and 30, all of which grew up to 3 ft. to 3 ft. 6 in. in height.

Successful varieties grown at Njoro are being passed on to certain native areas of somewhat similar climatic conditions.

Njahi (Dolichos lablab)

Of the 19 strains of Indian Njahi commented upon in my report last year, only eight were selected for a final statistical test during the year under review. Observations on the foliage were noted throughout the growing period, while the yields recorded are as follows:—

D.L. Strain ..	3.	4.	6.	8.	9.	10.	18.	19.
Yield (bags per acre)	4.55	3.55	5.37	3.82	4.37	4.46	3.82	3.73

From the point of view of density of foliage, numbers 3 and 18 were the best, followed by 4, 6 and 8, and after considering the results obtained from this trial during the past three years it has been decided to retain strains D.L. 3 and D.L. 6.

Sugar Beet

Trials of sugar beet with a view to seed production have been carried out, but it would not appear that the possibilities in this direction are very great.

Essential Oils

Under suitable climatic conditions peppermint has grown very well, the quality of the oil has been satisfactory, and it has always appeared to be a most promising crop. Indeed, so promising did the crop appear that it was hoped to export relatively large quantities in 1936, but unfortunately, just before harvest, mint rust appeared and almost completely defoliated the plants. Almost every field of peppermint in the Colony has suffered to such an extent that the growing of this crop has practically been abandoned.

The experiments on lavender have progressed, and favourable reports have been received on the oil.

Investigations on Miscellaneous Crops Carried Out by the Imperial Institute

During the year several crops and crop products were forwarded to the Plant and Animal Products Department of the Imperial Institute for examination and report. A summary of the reports received from the Imperial Institute is given below.

Gums

Four samples of gum, obtained from the Northern Frontier Province, were submitted in order to ascertain their quality and value. Three of the materials represented "clean," "medium," and "dirty" grades of the gum from the same

species of *Acacia*. Of these, the "clean" grade was valued by merchants at Sh. 27 per cwt. in London, with Kordofan Cleaned Gum at Sh. 33 per cwt., whilst the two lower grades would probably not be marketable, on account of their darker colour and dirty appearance. The fourth sample submitted was a gum of good appearance and quality, and was considered by the merchants to be worth Sh. 30 per cwt. A firm of confectionery manufacturers expressed their willingness to make tests with this last-named gum, and with the best of the other three products, if the prices and prospects of regular supplies in quantity were satisfactory, and the merchants mentioned above offered to receive trial shipments of one ton each of the same two gums for the purpose of practical trial.

Frankincense

This sample, obtained in the Northern Frontier Province, consisted mostly of dust with very small tears and fragments. On examination it was found to differ from the gum olibanum of commerce in containing a larger proportion of resin and very little gum, whilst the aroma on burning, though pleasant and fairly good, was somewhat less fragrant than that of gum olibanum of good quality. Brokers in London expressed the view that the material had been collected from a different species of *Boswellia* from that furnishing the commercial article. A firm of merchants valued the product nominally at about Sh. 30 to Sh. 35 per cwt. in London, and suggested that a small shipment of about half a ton should be forwarded to test the market. It appeared somewhat doubtful whether it would be practicable or remunerative to grade the material by picking and sifting, but if this proved feasible a better price would probably be obtained.

Cascara Bark and Twigs

These materials, which were sent from Mr. G. Walker, and obtained from young trees on a plantation, consisted of samples of bark and of large and small twigs, and were found on examination to yield respectively 25.3, 9.0 and 10.9 per cent of aqueous extract. The quality of extract was satisfactory in the case of the bark, and importers in London to whom samples were submitted considered that such bark should be worth about Sh. 40 per cwt. in the United Kingdom at the time (the price of cascara bark has since risen substantially). The firm offered to purchase shipments of the bark, but they expressed the opinion that the twigs would be of no interest on the market, and this view was supported by manufacturing druggists who were also consulted. It was pointed out by the

Imperial Institute, in forwarding the report, that cascara bark must be at least one year old before use, but that for this purpose it is warehoused in the importing country.

Tung Oil (Aleurites montana) *Fruits*

These fruits, forwarded by the Forest Department as representing the first crop of *A. montana* trees grown in the Nairobi Arboretum, varied in size from very small to medium and were not fully developed. The kernels, however, proved to contain a satisfactory percentage of oil, and the constants of the oil mainly fell within the ranges of figures obtained for *A. montana* oils previously examined at the Imperial Institute. Such differences as were observable might be attributed to the oil being obtained from the first crop of fruits and/or to the fruits not being fully developed, and it was suggested that a sample of fruits from the following year's crop from the same trees should be forwarded to the Imperial Institute for examination, in order to ascertain whether the oil continued to show any abnormality.

Forage Crops

From a study of the monthly variation in butterfat records, it is apparent that farmers are not providing for a sufficient supply of supplementary home-grown foods during the dry periods of the year, and it is again desired to emphasize the importance of the role played by forage crops in the economy of stock farming. With the development of mixed farming the inclusion of an acreage of forage crops in the rotation is essential. From the economic point of view the present prices of butterfat scarcely justify a large expenditure on purchased concentrated foods when a supply of home-grown foods can be obtained at a much less cost.

The Division has continued to make valuable investigations on the growing of forage crops, and in order to provide for the varying climatic and topographical conditions trials are conducted at four main centres, viz. Scott Agricultural Laboratories (5,700 feet), Rongai (6,100 feet), Njoro (7,100 feet), and Molo (9,000 feet), and in addition experiments are carried out on farms under intermediate conditions.

Forage Crop Trials

A trial of the most successful of the forage crops was laid down at Njoro this year in order to determine their total annual yields and their availability at certain seasons of the

year. Since some of the crops take a considerable time to establish, results for one year are not of great value by themselves, and the experiment will therefore be continued over a period of years.

The crops included in this experiment are as follows:—

1. Songhor Napier Grass,
2. Imported Napier Grass,
3. Uba Cane,
4. Thousand-headed Kale,
5. Hubam Clover,
6. Lucerne (Provence).

An excellent stand of all these crops was secured. Hubam clover was the quickest to yield a cutting after planting, and again showed its ability to withstand drought. Good hay was made from it by shade-drying, and although slightly more stemmy than lucerne it proved almost as palatable. The results of the first year's cuttings are as follows:—

Crop	Total weight of green matter in tons per acre	Number of cuttings
Songhor Napier Grass ..	20·8	1
Imported Napier Grass ..	28·8	1
Uba Cane	..	..
Thousand Headed Kale..	25·4	1
Hubam Clover	19·5	3
Lucerne	4·7	2

Napier Grass

There appear to be several indigenous strains of Napier grass present in the country, and although they are at present all botanically known as *Pennisetum purpureum*, differences in their habit of growth are noticeable. Investigational work therefore continues on this valuable fodder crop, and exotic and indigenous strains are being subjected to yield and other tests.

Silage

It must again be emphasized that there can be no better method of insuring against loss of grazing and other succulent feeds, either through drought or by locusts, than by having a reserve of silage which can be used at will. In the past, difficulty in making Napier grass silage has been experienced, and as this grass is one of the most widely used fodders at

the present time experiments were designed to test the best means of converting it into silage, the treatments being as follows:—

(1) Napier grass cut into 3 in. to 4 in. lengths and 1 per cent by weight of molasses added; ensiled fresh.

(2) Napier grass cut into 3 in. to 4 in. lengths and wilted for two days before ensiling; 1 per cent by weight of molasses added.

(3) Napier grass cut into 3 in. to 4 in. lengths; 10 per cent by weight of sugar cane added, and no molasses.

(Previous observations have shown that it is essential to cut material into short lengths before ensiling.)

The silage from (1) was of very good quality and most palatable, while that from (2) and (3), although of good quality, was produced at a higher temperature, which caused a greater waste and was not so palatable. The silage made with sugar cane and without molasses was of good quality, but did not prove so palatable as the molassed material.

Vetches

In the Rongai-Molo-Njoro area one of the most useful forage crops has been proved to be the Purple and Hairy variety of vetches. During 1936 these were grown on a considerable scale, both for use as green feed and for hay. At Rongai a mixture of oats and purple vetch gave a yield of 3.7 tons of hay per acre, while at Molo a mixture of oats and hairy vetch gave a yield of 4.72 tons of hay per acre. Hay made from purple vetch alone yielded 4.75 tons per acre. The seeding rate for the mixture was: oats, 35 lb. per acre; hairy vetch, 15 lb. per acre. For the pure stand of purple vetch the seeding rate was 26 lb. per acre. Not only are these crops very valuable for supplying supplementary feeds for live stock, but they should serve a most useful place in the rotation; and the beneficial effect on a succeeding maize crop of a previous vetch crop has already been demonstrated.

Miscellaneous Forage Crops

A wide range of other forage crops has been tried. Those that have proved themselves outstanding under dry conditions at Rongai, in addition to Napier grass and purple vetch, are Hubam clover, soya beans and pumpkins. At Njoro the following proved the most suitable crops: Thousand-headed kale, Hubam clover, oats, peas, vetches, and Napier grass.

At Molo, where forage crops and mixtures suitable for cutting and sheep folding have been sown, oat and vetch mixtures have proved the most successful.

Pampas Grass

This grass, although it was difficult to establish, has grown well at Njoro throughout the year. It is very drought-resistant, remains green throughout the dry season, and has proved palatable to cattle.

Sainfoin

This was established at Njoro and Molo in 1935, but growth during that year was poor; unfortunately the growth has again been very poor throughout 1936, and further trials are not recommended.

Sprouted Grain

The use of sprouted grain as a stock feed is becoming of great importance in Europe, and during the year work was commenced on this product at Njoro. Up to date, maize, barley and oats have been used, and successful results have been obtained. Oats have yielded, in 12 days after soaking, over four times the bulk of grain used; the sprouts have been 4 inches long at this stage. When fed to stock, in particular young calves, it has proved extremely palatable. The technique employed at present is very simple, and a constant supply of this material could be assured all the year round under average Kenya conditions.

INDIGENOUS LEGUMES FOR GREEN MANURING

The indigenous leguminous plants in Kenya are most numerous, and the search for suitable legumes both for green manuring and for inclusion in pastures continues. During the past few years large numbers of species have been collected and put under trial. A tentative list of the genera represented includes many *Tephrosia, Indigofera* and *Crotalaria* species, and also *Dolichos, Eriosoma, Glycine, Rhyncoria* and *Astragalus*. At Kitale, the *Indigofera* species appear to offer the greater possibilities, while at Njoro a *Crotalaria* obtained from the Kinangop Forest grew very well, made a bush about 2 ft. 6 in. high, and flowered and seeded profusely.

CATTLE FODDER ARBORETA

In the drier areas of the country, stock farming is an essential basis for any successsful form of agriculture, and of recent years the Division has been establishing trial plots of cattle fodder trees in representative areas. During 1936 arboreta were established at Naivasha, Rongai and Taveta, while the old arboretum at Machakos was re-established.

A list of trees planted at each centre is given below:—

Machakos:

Prosopis juliflora,
Brachychiton populneus,
Casuarina stricta,
Celtis sinensis,
Eucalyptus microtheca,
Phytolacca dioica.

Naivasha and Rongai:

Brachychiton populneus,
Brachychiton rupestre,
Casuarina stricta,
Celtis sinensis,
Eucalyptus microtheca,
Phytolacca dioica.

Taveta:

Brachychiton populneus,
Casuarina stricta,
Eucalyptus microtheca,
Eucalyptus albens,
Eucalyptus cladocalyx,
Phytolacca dioica.

Arrangements are also being made to establish arboreta in the Eldoret, Nanyuki and Narok areas.

Pasture Research

In the past agriculturists of the country have been apt to give prior thought to the improvement of their crops, while little or no attempt has been made to improve their pastures. This was expected to be a natural outlook on the part of purely arable farmers, but with the establishment of a mixed farming policy the importance of grassland improvement in the farming economy is now being increasingly recognized, not only by farmers in the arable areas, but also by those in the pastoral areas.

The work of grassland research has developed rapidly during the past five years, and is now being carried out at a number of stations throughout the country under the co-ordinating guidance of the Agricultural Officer in Charge of Grassland Improvement, who has his central station at Kabete. The more important of these centres are Kabete, Ngong, Fort Hall, Naivasha, Njoro, and Kitale, which cover

varying climatic zones and different types of vegetation. During the past year investigations have continued on the lines indicated in the 1935 Annual Report of the Grassland Officer, and in addition a considerable amount of survey work has been undertaken in connexion with a development scheme for the Masai Reserve.

Trials of Grass and Legume Species

The search for indigenous and introduced pasture plants suitable for use in the higher and intermediate zones of the country has already yielded several types of outstanding promise.

Kikuyu Grass (Pennisetum clandestinum) *Strains*

Three different types of this indigenous grass have been obtained and have been subjected to comparative tests under a system of cuts in which differences and seasonal yield and the power to withstand cutting is becoming evident.

Rhodes Grass (Chloris gayana) *Strains*

The use of a strain of this grass obtained from Queensland, and originally of African origin, has been considerably extended during the past year both for pasture and hay production, and a supply of locally produced seed is now available.

Work on the different strains continues. Three clearly different types of good promise have been isolated, and are receiving special attention, while a number of other possible strains are under observation at Kabete.

Lucerne

In an attempt to find a suitable legume for sowing in mixture with grasses, selection has been carried out from lucerne plants found surviving in pasture established on old lucerne areas, and some results appear to have been obtained in the production of this adapted type.

Indigenous Clover (Trifolium Johnstonii) *Strains*

Three types of this clover, which occurs naturally in the herbage of Kikuyu grass areas, have been isolated. Comparative tests at Kabete show that the most common of these strains is subject to a virus disease which causes a premature withering of the leaves. One of the chief disadvantages of these strains is the tendency to die back during the dry seasons.

Amongst other indigenous legumes, *Indigofera tettensis* continues to give good results.

Drought-resistant Grasses for Comparatively Dry Areas

Out of a total of some 54 grasses, both indigenous and exotic, tried in the Rongai area, the following have proved themselves outstandingly useful on account of their resistance to drought and their ability to yield:—

Indigenous *Cynodon* sp. (Star grass); *Amphilophis pertusa, Melinis minutiflora* (Molasses grass); *Setaria aurea* (Golden Timothy); *Cenchrus ciliaris* (erect and creeping strains); *Chloris gayana* (Rhodes grass, Australian and Kitale strains); while *Digitaria eriantha* (woolly-finger grass) has made fair growth, appears to be drought-resistant, and shows promise for Rongai conditions.

The large Star grass shows considerable promise, since it is drought-resistant, spreads rapidly over the land, and can be very easily established from cuttings. The establishment of Rhodes grass has proved extremely simple, which is an important factor in estimating its value.

Trials of Grasses in the High-altitude Moist Areas

In this type of country a herbage of Kikuyu grass and indigenous clover follows the clearance of forest, and is subsequently succeeded by definite and less desirable grass stages of the plant succession as the soil fertility falls. This retrogression of the vegetation can be arrested, and swards of Kikuyu grass, which are admirably suited to intensive management, can be obtained by applying proper intensive grazing methods.

Phalaris tuberosa

At Molo, a half-acre block of *Phalaris tuberosa* has again proved itself of great value, and with moderately heavy grazing it has tended to alter its rather upright habit to a more spreading nature. The incursion of Kikuyu and other stoloniferous grasses into the plot has been practically negligible—a factor of considerable importance for short-term leys.

Paspalum dilatatum

On a small scale *Paspalum dilatatum* has proved very promising under Molo conditions, and this grass will now be subjected to actual grazing trials.

Rhodes Grass (Chloris gayana)

Two attempts have been made to establish Australian Rhodes grass (seeding rate, 10 lb. per acre) on a large scale at Molo, but each has been a complete failure, although promising results were obtained from a small plot.

Experiments at Thomson's Falls

Three large grass plots were sown down to (1) Australian Rhodes grass, (2) *Paspalum dilatatum,* (3) *Phalaris tuberosa,* at Thomson's Falls, on a poor soil which had largely been trodden out to *Pennisetum schimperi.* Growth during the year was very slow, but although the Rhodes grass and *Paspalum* are worth further trial, the *Phalaris* did not prove sufficiently drought-resistant to be of any value for these conditions. From observations made, it is apparent that in order to make the grazing more productive on these poor soils it will be necessary to increase their humus content.

Mixtures for High-altitude Areas

During the year mixtures of the species which have proved successful as pure stands under grazing conditions have been laid down in half-acre blocks at Molo. A good stand of the grasses has been obtained without resorting to hand weeding. The mixtures are as follows:—

Species.	*A—Seeding rate per acre.*	*B—Seeding rate per acre.*
Italian ryegrass ...	3 lb.	2 lb.
Perennial Ryegrass ...	1 lb.	4 lb.
Meadow Fescue ...	3 lb.	4 lb.
Danish Cocksfoot ...	1 lb.	1 lb.
Phalaris tuberosa ...	1 lb.	2 lb.
	9 lb.	13 lb.

Birdsfoot Trefoil has proved to be the most suitable leguminous plant for temporary pastures under Molo conditions, and will be included in subsequent mixture trials.

Manurial Experiments

Experiments dealing with the application of artificial fertilizers on both veldt and Kikuyu grass grazing have been continued, and results have again been somewhat disappointing. It has been shown that after heavy rains nitrogenous manures stimulate the growth of grass to a marked degree, but that otherwise no further results have been observed from this or from the application of phosphatic or potassic inorganic fertilizers.

The response due to the application of humus, both in the form of *boma* manure and wheat chaff and cavings, has been very noticeable, and this supports all the evidence already existing showing that organic matter is the essential factor for the good growth of Kikuyu grass.

It is possible that when the humus content of the soil has been raised to a level sufficiently high to make it a non-limiting factor, the effects of artificials such as superphosphate and sulphate of potash may become noticeable.

Grazing Trials

Investigational work on the effects of grass burning and of different intensities of grazing on the natural herbage and trials of pastoure and fodder plants is progressing. At Rongai the growing of the most promising and successful species of grasses has now been extended to large-scale grazing plots, in order to subject them to actual grazing conditions. Four grasses, namely, indigenous Star grass, Australian Rhodes grass, Molasses grass, and *Paspalum dilatatum,* are being established on a piece of over-grazed grassland belonging to Mr. J. E. A. Wolryche-Whitmore, which was ploughed up for the purpose. It is hoped to add to these certain others, in particular *Amphilophis pertusa, Cenchrus ciliaris,* and the Kitale strain of Rhodes grass, all of which have proved themselves drought-resistant and able to withstand the conditions at Rongai.

At Njoro the following four types of grassland have been established, and are being subjected to grazing tests:—

1. Natural reversion.
2. Australian Rhodes grass,
   Lucerne.
3. Australian Rhodes grass,
   Lucerne,
   Paspalum dilatatum.
4. *Phalaris tuberosa,*
   Paspalum dilatatum,
   Panicum antidotale,
   Korean Lespedeza.

In pasture No. 4 the *Paspalum* and the *Panicum* are now present in very small quantities, as they were choked out by the vigorous growth of the *Phalaris* in its early stages. The Lespedeza has disappeared completely. In pastures Nos. 2 and 3 the lucerne has failed to persist to any appreciable extent in competition with the Rhodes grass. Generally speaking, however, these grasses which have been tried on a large scale have given satisfactory results, with the exception of *Phalaris tuberosa,* which is not suited to Njoro conditions, as it wilts readily at the onset of the dry weather.

It has been difficult to keep accurate records of the carrying capacity of each type of grazing, as the cattle have always received additional hand feeding. However a certain allowance has been made for this, and the following figures give an approximate indication of the number of cattle days per acre:—

Pasture 1: 140 cattle days.
Pasture 2: 199 cattle days.
Pasture 3: 211 cattle days.
Pasture 4: 85 cattle days.

These figures indicate the value of established pasture as a means of obtaining a greater carrying capacity, and it is even probable that a still better pasture could be obtained if sheep could be used as followers to the cattle.

It is hoped that more accurate figures relating to the stock-carrying capacity of varying types of grazing will be obtained from the large reversion of arable lands experiment mentioned on a previous page of this report.

At Ngong the intensity of grazing and grass burning experiments have been continued, but over a period of from three to four years it would appear that no very marked effects have been produced under the various treatments.

Rejuvenation of Pastures

The large-scale grassland rejuvenation experiment on Mr. W. G. Sewall's farm has been continued, and it is interesting to record that all the plots which were thoroughly cultivated by ploughing and harrowing have been very heavily grazed, which thus demonstrates the value of thorough cultivation in the establishment of a good sward.

At Naivasha, where the experiments bear on the problems of some of the drier areas of the country, attempts are being made to rejuvenate depleted pasture by sowing various grasses and legumes and by different surface treatments of the soil. Owing to the erratic rainfall, work has made but little progress, although the Australian type of Rhodes grass promises to be useful as a hay crop.

Grassland Work in Native Areas

An account of this work, which includes that in connexion with a scheme of development for the Masai Reserve, will be found in the portion of this report which is devoted to native agriculture.

Investigational Work on Soils

Owing to pressure of work of immediate economic importance ,the Soil Chemist has not been able during the year to devote much time to soil survey work; up to date 37 soil series have been identified and recognized.

The work on the phosphatic status of the Kikuyu red loam, the major coffee soil of the Colony, has been continued. It has been found that these soils are so active in "fixing" soluble phosphate that all the phosphate in a solution was retained in the top inch of a column of soil four inches high. This shows that in the field most of the phosphate applied would be retained in the top few inches. Indeed, it has been found that after seven years, following numerous cultivations, most of the added material is still retained in the upper four inches of the soil. A small increase of phosphates was noticed in the second four inches as compared with the control plot, but repeated cultivation below the four-inch depth may have been partly responsible for this increase. No increase in the reserve of phosphate has been noted below a depth of eight inches.

It is recommended therefore that, in applying phosphatic manures, care should be taken to get them down as far as possible with cultivation, and that the cheaper phosphates, such as bone meal, should be used.

Effects of Cover Crops and Napier Grass

Marked increases in the total nitrogen content have been found in soils which have been continuously under a leguminous cover crop or which have been planted to Napier grass.

Composts

From the analysis of samples of compost received by the Chemistry Section it has been found that many farmers are using very large quantities of soil in composting. In the original Indore technique, soil is added because of its lime content, but the adding of quantities of acid soil simply dilutes the compost, and indeed it has now been shown that compost can be made without any addition of soil.

Soil Erosion

The more energetic campaign against soil erosion which was started by the Department in 1935 was continued in 1936, and it is gratifying to record that increased appreciation of the dangers of soil denudation was noticed amongst European farmers, particularly in the Trans Nzoia, where a number of

farmers protected a considerable acreage on their farms by means of broad-base terracing during the course of the year. Nevertheless, it must be admitted that there is still a great deal to be done in this direction, and the principal need at the moment appears to be for a terracing unit which will carry out work on contract, whether by Government or by private enterprise, on the land of farmers who find themselves unable, for one reason or another, to carry out the work for themselves. The demonstration of broad-base terracing, which was set out on Mr. G. C. A. More's farm at Kitale in 1935, continued to control wash efficiently, and this farmer was so pleased with the results that he proceeded to protect the remainder of his arable land by mangum broad-base terraces in the same manner. Demonstrations of contour ridging were also laid down on the Plant Breeding Station at Njoro, where various simple levelling instruments, suitable for contour ridging, and which could be made cheaply on the farm, were tried out. Many farms were visited by Agricultural Officers, and advice given to farmers on the spot regarding the application of suitable anti-erosion measures.

Addresses and demonstrations were given to various district associations, including those of Timau and Makuyu, in both of which districts it was stressed that there was great need for the protection of forest and bush on steep slopes, and for the prevention of excessive evaporation of moisture from arable land and pasture by the planting of suitable windbreaks. Close touch was maintained with the Forest Department on these matters, since in the preservation of soil and water supplies of the country agriculture and forestry must march hand in hand.

The Department also continued to receive much assistance from the Kenya Arbor Society, in which the energy and enthusiasm of the secretaries, Major and Mrs. E. H. Ward, of the Kinangop, did not flag. Officers of the Department of Agriculture gave addresses at several meetings of the Society relating to soil erosion and general questions relating to the proper utilization of land.

Windbreaks

Demonstration windbreaks were established in 1936 at three centres, Njoro, Rongai and Molo, the design and lay-out being prepared by Mr. S. H. Wimbush, Utilization and Research Officer, Forest Department, who has rendered much valuable assistance.

The windbreaks in every case consisted of three layers of trees, short-growing species being planted in the direction of the prevailing winds, with intermediate species in the middle, and tall quick-growing species to the leeward side. Each windbreak was 60 feet wide and 50 yards long, and at each of the three centres, Njoro, Molo and Rongai, five different combinations of tree species were tried. For ease of establishment under the conditions prevailing at these three centres the following species proved the most suitable:—

	Short growing Species	Intermediate	Tall, quick growing
Njoro ..	Kei Apple. Mauritius thorn	Pepper tree. *Cupressus torulosa.*	*Eucalyptus saligna.*
Molo ..	*Hagenia* spp.	*Cupressus macrocarpa*	*Eucalyptus globulus.*
Rongai ..	Kei Apple.	Pepper tree. *Croton megalocarpon.*	*Eucalyptus maculata.*

The efficacy of these species as windbreaks, or the best combination of these species, is not as yet proved, since growth of some is still in the initial stages.

A considerable amount of work has been carried out at Kitale in connexion with windbreak experimentation. Three windbreaks were completed during the year, the trees used being *Eucalyptus saligna, Grevillea robusta, Juniperus procera* (Cedar), and *Olea chrysophylla* (Brown Olive). The main fuel reserve and windbreak is 33 rows wide and 300 yards long, planted at 5 ft. x 5 ft.; it includes *Podocarpus gracilior, Pygeum africanum, Olea chrysophylla, Juniperus procera, Eucalyptus saligna,* and *Grevillea robusta.* The standard belt, 60 feet wide, is also 300 yards long; in this case the five middle rows are *E. saligna,* with *J. procera* on one side and *G. robusta* on the other. Land has been prepared for three more belts to be planted in 1937 with trees supplied by the Forest Department; one belt will consist of indigenous trees only. When completed, the scheme will comprise six windbreaks of different kinds, each 300 yards in length and spaced 250 to 300 yards apart.

Shade Trees

Demonstration shade trees have also been planted at Njoro, again with the advice and help of Mr. S. H. Wimbush. Results are still very indefinite, but of the species tried the Pepper tree and *Angophora* appear to be easy to establish and quick growing. The importance of providing shade for

cattle in paddocks is not always realized by farmers. The trees are planted in small clumps of four to six trees throughout the paddocked areas.

Trials of Hedge Plants

Trials of five varieties of hedge plants were laid down at Njoro. These varieties were recommended by the Forest Department, and were as follows:—

Mauritius Thorn,
Cotoneaster pannosa,
Bougainvillea sp.,
Carissa edulis,
Kei Apple.

Mauritius thorn has proved quickest to grow and easy to establish. It has grown 3 ft. 6 in. high during the first year, while the other varieties, in particular *Carissa edulis,* have made very little growth.

Marketing

Johannesburg Empire Exhibition

The Marketing Officer assisted in the staging of the trial lay-out of the Kenya produce exhibit for this exhibition, and also assisted in the collection and despatch of the exhibits.

As a result of this exhibition many inquiries for Kenya produce were received and dealt with. In particular, sorghums were in demand. Owing, however, to the Union veterinary legislation Kenya sorghums cannot be imported into South Africa.

Fruit Growers' Association

In July certain fruit growers asked this Department to help in organizing the fruit industry. A meeting was convened at which an association was formed, with the Marketing Officer as secretary.

Draft rules for the association have been drawn up and members are being enrolled, while investigations of overseas markets are being made and experimental consignments of fruit have been sent abroad.

It is hoped to organize the marketing of fruit for members on the local market, and it is probable that the agents of the association—the Kenya Farmers' Association—will open up a depot in Nairobi.

One of the aims of the association is to improve the quality of local fruit, and Government will be asked to help by inspection of fruit leaving Kenya for overseas.

NATIVE AREAS

The following section is devoted to the more important matters of administration, progress and investigational work carried out in native areas.

Central Province

Staff

The European staff during the year consisted of one provincial officer and six district officers, the provincial officer carrying out district work in South Nyeri in addition to his provincial duties.

Population

The native reserves of the Province cover an area of 13,494 square miles, and carry a population of 1,045,039.

Agricultural Zones

The Province is divided into five agricultural zones, based mainly on climatic and soil conditions. The first zone is situated on the upper slopes of the Aberdares and of Mount Kenya, and embraces all land over 6,000 feet above sea-level. The soil is light and carries a sparse population, being suited to wattle, wheat, dairying and sheep farming. The zone extends to an area of 665 square miles and carries a population of 170,220.

Zones two and three are situated between elevations of 4,000 feet and 6,000 feet, and cover an area of 2,896 square miles, with a population of 734,844. This zone contains some of the most fertile lands in Kenya, and is suited to the cultivation of a wide variety of crops, including maize, beans, potatoes, wattle and coffee. The population in certain areas is heavy, and over all averages 253 to the square mile.

The fourth and fifth zones are but sparsely populated, and cover an area of 9,933 miles, or about three-quarters of the total area of the Province. Portions of the area are "fly" infested, and the whole is subject to periodic droughts. The darker soils are fertile, and capable of supporting fair crops of cotton, millet, sorghum and cassava.

Nyanza Province

Staff

The European staff includes one provincial and five district officers, including one in charge of Bukura Training School. The provincial officer is also responsible for the South Lumbwa and Nandi districts.

Agricultural Zones

In 1932 the three Kavirondo districts were divided into a number of zones according to the climatic conditions, habits of the people, disposition of transport facilities, and other reasons. To date, these have served a useful purpose, but it is now evident that certain changes could be made because of our greater knowledge of the conditions and the gradual change which has taken place in cropping. In 1932 maize was our chief cash crop, while the cotton harvest was less than 3,000 bales. Now that the crop approximates 18,000 bales and is our leading cash crop, it is evident that the crop has invaded areas which had not been proved suitable in 1932. Such a change of outlook had to be expected at the inception of the zoning system, and is no doubt partly the cause of our unprecedentedly rapid development.

Coast Province

Staff

The European staff consisted of one provincial officer, two district officers, one officer in charge of Kibarani Experimental Station, and one Asiatic agricultural assistant.

Population

The districts of the Province cover an area of 26,651 square miles, and carry a total population of approximately 300,000.

Agricultural Zones

The Province consists of six districts and one sub-district and with the exception of the Teita district they lie along the Coast from the Tanganyika border in the south to the Italian Somaliland border in the north.

Kilifi and Digo districts have each been divided into five agricultural zones, the division of these zones being based on climatic and soil conditions and, to some extent, the habits and type of agriculture adopted by the people. These zones form a useful purpose in drawing up and putting into practice definite lines of policy and agricultural development.

The Lamu district has not been zoned. Soil and climatic conditions are not quite so varied, there is no permanent supervisory staff in the area, and development is proceeding on more general lines, but with cotton production as the main objective at the moment.

Although the Tana River district has not been definitely zoned, this area is subdivided roughly into the Lower Tana, Middle Tana, and Upper Tana divisions.

Mombasa district is comparatively small, and has fairly even soil and climatic conditions over the area under cultivation. Agriculture here has proceeded on the lines of cultivating more permanent crops such as fruit, coco-nuts, cashew nuts, etc.

The Teita district is divided naturally into three zones, viz. Teita Hills, Taveta, and the low arid area from Voi to Bura; each calls for its own line of development.

General

Despite very unfavourable weather conditions over most of the Provinces during the latter part of the year under review, 1936 is regarded as a year in which the progress of native agriculture has been most satisfactory. In all districts in which services are given, anti-erosion measures are proceeding extensively; work for the improvement and increased production of the more important food and cash crops is being rapidly consolidated, while the development of the crop marketing and inspection services is having far-reaching effects, both on the quality of the produce offered for sale and on the growing of more remunerative types of both food and cash crops.

It is often considered that the native is the most conservative type of farmer in existence, and there has been a certain criticism on the part of many that the advancement of his agriculture has not been sufficiently rapid, but those who are aware of the increasing wealth in the native reserves realize that the natives in many areas are developing their agriculture to a point surpassing that of their education for economic spending powers, and that, unless the native is taught to put his money to proper use, his sociological position is likely to have a retrogressive tendency. The accumulated effect which the work of the field staff has had on native agriculture during the last seven years is quite remarkable when the former condition is kept in mind. Not only has the production of cash crops increased rapidly, but perhaps what is even of greater importance in the initial stages of development, the food situation in the reserves is now on a vastly more secure basis. This latter work may not have been apparent to casual observers who judge the extent of development from export statistics alone. It has been the first duty of the Department to make the native's food supplies secure; to increase exports has been entirely subservient to this, and the substantial increase which has taken place, both in volume of produce and in higher unit values due partly to improved

quality, has not been out of accord with this policy; a large part of the exports is in fact surplus food crops. The work of the field staff covers the following activities:—

(*a*) Selection of early maturing, heavy-yielding and drought-resistant strains of existing native crops and of introduced crops;

(*b*) Introduction and trial of new crops and new varieties of existing crops;

(*c*) Bulking of proved varieties on Local Native Council seed farms and distribution of seed;

(*d*) Propaganda for widespread planting of drought-resistant crops such as cassava;

(*e*) Propaganda for the increased planting of proved cash crops subsequent to making the food crop situation as secure as possible;

(*f*) Instruction, accompanied by demonstration, relating to the maintenance of soil fertility and soil conservation, and the development of mixed farming.

Famine Prevention

In the past the introduction and multiplication of drought-resistant food and cash crops has occupied a considerable proportion of the time of field workers, and during the year this valuable work has been continued. In the drier areas of each Province campaigns for the planting of cassava are now showing substantial results. In Nyanza Province this is now a staple food in several areas, and is rapidly becoming accepted in others. In the Kitui district of the Central Province it has been estimated that 26,000 acres of cassava were planted during the year. In the Coast Province, where mosaic disease of cassava is very prevalent, the selection and production of a resistant strain is regarded as being of inestimable value. Root crops are considered to be one of the best forms of insuring against a famine; they are drought-resistant, and provide a steady supply of food from the underground tubers at times when other crops are drought-stricken or destroyed by locusts. The growing of extra supplies of sweet potatoes and bananas is also receiving prominence, while the growing of drought-resistant cash crops is doing much to alleviate the position.

In addition to this work, attention has also been given to the selection and issue of earlier maturing cereals and legumes, while at the same time maintaining or increasing the yielding capacity of these crops. In Nyanza Province the

production of improved strains of eleusine and sorghum millets and the introduction of tepary beans in the drier areas has been of the greatest economic importance. Progress in the selection of early maturing sorghums and higher-yielding bulrush millets in the Central Province has been satisfactory, while improved strains of legumes such as tepary beans and cowpeas have been selected for distribution. The early maturing Muratha maize has been of great value to this Province. Work at the Coast Experiment Station, Kibarani, has provided a selection of food crops very suited to the dry areas of the Coast; these crops include early maturing maize, sorghums, foxtail millets, pigeon peas and tepary beans.

The introduction of new food crops in native areas is fraught with several difficulties, not the least of which is the suspicious and conservative taste of the native. Difficulties are being overcome, however, and many are now realizing the place that such food crops should occupy in the economy of their agriculture, and with the continuation of the various campaigns at present in operation the danger of famine in the more important native areas will be negligible as compared with the position of but a few years ago.

Cash Crops

Cotton

This industry has again shown most satisfactory progress in all Provinces, and during the year a further three ginneries were erected (at Lamu, Sagana and Ndere) in order to cope with the rapidly increasing crop.

The number of ginneries in the Colony is now as follows: Nyanza Province, 6; Central Province, 2; Coast Province, 4.

The following figures show the increase that has taken place during the last seven years in the production of cotton in the Colony:—

Year	Nyanza Province	Coast Province	Central Province	Total Production
	Bales	*Bales*	*Bales*	*Bales*
*1930–1 ..	740	43	—	783
1931–2 ..	1,257	487	—	1,735
1932–3 ..	3,219	1,057	—	4,276
1933–4 ..	5,690	1,059	—	6,749
1934–5 ..	7,206	1,567	—	8,773
1935–6 ..	11,830	3,730	223	15,783
1936–7 ..	17,840	2,840	1,486	22,166

*The first year shown is the year of planting ;harvesting and ginning extends into the following year.

Prices received for A Grade cotton have been steadily higher than for a considerable number of years. The average price paid to the growers was approximately 13 cents per lb. of seed cotton. The total production from the 1936 planted crop represents a revenue of about £180,000.

Towards the close of the 1935-36 season the price of cotton declined, and the established growers in Nyanza Province became somewhat discouraged, and for a time some alarm was felt regarding the prospects of the 1936-37 crop. However, as events showed, the crop was increased by some 33 per cent over the record set in the previous year.

During 1935 cotton-growing in the Central Province was regarded as being purely experimental, and it has been found that it is almost the only economic cash crop suitable for the lower areas. During 1936 cultivation increased rapidly, but results in certain districts are still problematical. At present Kitui is the main cotton-producing district of Central Province; in 1935 approximately 4,000 acres were planted and 1,437,333 lb. of seed cotton were harvested from the crop during 1935 and 1936. The area was extended in 1936 and 8,000 acres were planted in November.

In the Coast Province the acreage planted to cotton in 1936 showed an increase of 50 per cent over that of the previous year, and a 50 per cent increase in yield was anticipated. Owing, however, to adverse weather conditions coupled with a severe attack of areolate mildew in the southern areas, which occurred at a time when the plants were fruiting, the crop was disappointingly light. In the Tana River, Lamu and Taveta areas the position was very encouraging, and good yields were obtained.

As regards pests and diseases, stainer continues to be a problem in the Central Province, and although it is present in the Nyanza and Coast Provinces the incidence is not so severe. Pink bollworm is present at the Coast, and the infestation increased somewhat towards the end of the season, and prompt uprooting was therefore enforced. The other areas in the country are free from this pest. Aerolate mildew also caused a heavy loss in yield in certain areas of the Coast Province. *Fusarium* wilt was found in an isolated area in the Coast Province. This disease is as yet of no economic importance, but precautions are being taken and wilt-resistant varieties have been obtained from America for breeding purposes.

Mr. S. Milligan, formerly of the Empire Cotton Growing Corporation, toured the cotton-growing areas in the Colony

at the instance of the Corporation during the latter months of 1935, and his findings were published in 1936 in a report, "Inspection Note on the Kenya Cotton Crop in November and December, 1935." This report contained many recommendations regarding the development of the cotton industry; these have all received attention, and the investigational work recommended by him has been commenced. An agricultural officer has also been sent to the Cotton Corporation's station at Barberton, South Africa, for a period of nine months in order to study cotton selection, experimental methods, and lint examination technique. While it is possible that the greater part of the Nyanza cotton area can adopt the Uganda findings regarding the strains of cotton to be grown, the Central and Coast Provinces present their own difficulties, and their problems are being worked out locally. Investigational work continues in all these provinces regarding cultural and interplanting methods.

During the year various samples of cotton have been sent to the Imperial Institute for examination and report. These reports are very encouraging regarding the quality of cotton being grown in Kenya, and they are serving a useful purpose, in conjunction with the variety trials, in assisting the Department to determine the type of cotton to be grown in the various areas. For instance, in the drier areas it is probable that a better monetary return may be obtained from the slightly shorter-stapled cottons. Although these do not command such a high price as the longer-stapled strains, they appear to be hardier and to give a greater percentage average yield per acre and a higher ginning percentage, which is likely to more than compensate for the slightly lower unit price.

The following are summaries of the Imperial Institute reports:—

I. Six samples of seed cotton from various areas in the Coast Province were examined and the lint submitted to brokers in Liverpool for classification and valuation.

Sample	Ginning Percentage	Classification	Value per lb.
Kilifi District, Variety N.17 ..	29·8	Strict good	7·55d.
Malindi District, Variety N.17 ..	27·8		7·85d.
Digo District, Variety N.17 ..	32·3		7·65d.
Taveta District, Strain 052 ..	33·0	Middling	7·45d.
,, ,, Strain 955 ..	33·8		7·55d.
,, ,, Strain 998 ..	34·8		7·50d.

At the time of making this report Middling American futures were quoted at 6.55d. per lb. in Liverpool.

II. Seven samples of seed cotton from various areas in the Central Province were examined and the lint submitted through the British Cotton Growing Association to brokers in Liverpool for classification and valuation.

Sample	Ginning Percentage	Classification	Value per lb.
Kitui : Grade I, Variety U/4/4/2	35·0	Good middling to strict good middling.	7·55d.
Kitui : Grade 2, Variety U/4/4/2	31·8	Middling	5·90d.
Machakos : Grade I, Variety N.17 ..	35·8	Good middling	7·55d.
Machakos : Grade 2, Variety N.17 ..	33·0	Middling	5·90d.
Fort Hall : Grade I, Variety N.17 ..	32·0	Good middling to strict good middling ..	7·45d.
Embu : Grade I, Variety N.17 ..	32·8	Good middling	7·55d.
Meru : Grade I, Variety N.17 ..	33·0	Good middling to strict good middling ..	7·95d.

At the time of making this report Middling American futures were quoted at 6.65d. per lb. in Liverpool.

III. A sample of U/4/4/2 seed cotton grown in the West Suk Reserve was submitted for examination and valuation. The yield of lint on ginning was found to be high, viz. 35 per cent, but the lint was somewhat stained, of short staple, and rather variable in strength. Brokers in Liverpool classified the cotton as "Strict Middling to Good Middling," and valued it at the nominal price of 5.75d. to 5.90d. per lb., with Middling American at 5.90d. per lb.

Wattle

The acreage under this crop continues to increase in the higher elevations of Central Province. With the compusory central inspection the quality of the bark has been rapidly enhanced, and there now exists a strong demand for Kenya bark. In 1933 Kenya bark was as much as Sh. 30 per ton less than that from Natal, but this adverse premium has been gradually lowered, and during 1936 the price of Kenya bark

varied between parity with Natal bark and Sh. 2/50 per ton less. The following figures of purchases after inspection show the progress made by this industry during the past few years:

	1931	1933	1934	1936
	Tons	*Tons*	*Tons*	*Tons*
Dry bark ..	9,600	10,800	12,900	11,979
Green bark (for extract) ..	..	..	3,780	8,309

The value of the 1936 crop to the natives was approximately £48,000.

In the higher areas of the Nyanza Province wattle planting is extending, though as yet there is no commercial industry. During the year 9,000 acres were planted, under supervision, in the Kisii, Serem, and Lumbwa areas.

The value of this crop as a soil rejuvenator and also as a means of afforestation, economically utilizing steep slopes, and counteracting erosion is being increasingly recognized, and this, with timber and fuel requirements for the natives themselves and the mines, is the main reason for planting in Nyanza.

Maize

An increase in the production of maize was very evident in certain areas in Nyanza, notably in the North Kitosh location of North Kavirondo, where exports from the area have risen from 4,600 bags in 1933 to 36,577 bags in 1936. Owing to issues of improved seed and inspection services, the improvement in the quality has been rapid both in Nyanza and Central Provinces, and it is now possible to export native grown maize to overseas markets on the same standards as European grown maize. Since 1929 no native grown maize has been exported (other than to local ports), and at that time it was of standard K7 (mixed) and K8 (undergrade). In 1936 a total of 58,700 bags of native maize was received for grading for export, of which 38.13 per cent was placed in grades K2 and K3 and K2 S.W. and K3 S.W. on the initial grading, while the total number of bags exported after initial grading and conditioning was over 57,000.

During the year the known local export of maize from the Nyanza and Central Provinces was 342,000 bags and the value to the producers is estimated at £83,500. This figure by no means show the total quantity exported, as it is impossible to obtain all records of produce leaving the districts by road.

Oil Seed

Large increases in the acreage of groundnuts and sesame were recorded in Nyanza during the year. In South Kavirondo, which is the main groundnut producing area, the crop sold was 2,121 tons, as compared with 782 tons in the previous year. Central Kavirondo produced approximately 500 tons. In North Kavirondo the crop is making slow progress. The quality of the nuts exported was excellent, and prices averaged about Sh. 3/25 per frasila at Kisumu. It is estimated that the growers received £23,330 for their crop.

The sesame yields were reduced owing to unfavourable weather conditions, but nevertheless some 2,938 tons were exported from the Nyanza districts, valued at £32,318.

Beans

The production of beans is increasing in the Nyanza and Central Provinces. This is essentially a short rains crop if produce of a good quality is to be forthcoming. Field selection of Canadian Wonder and Rose Coco is having a marked effect on the purity of the sample harvested, and this, together with hand picking of the crop prior to sale, should at no distant date improve the general standard of the crop. A low estimate of beans exported from these Provinces is 36,550 bags, valued at £14,500.

Rice

Satisfactory expansion in the cultivation of rice is taking place in certain locations in the Nyanza and Coast Provinces, and it is hoped that the propaganda regarding this crop in Central Province will have beneficial results in 1937. Nyakach (Nyanza) alone exported 2,000 bags during the year (prior to 1934 no rice was grown in this area), while the following figures indicate the expansion that has taken place on the Tana River:—

EXPORTS FROM TANA RIVER TO LAMU AND MOMBASA

	1934	1935	1936
	Tons	*Tons*	*Tons*
Hulled Rice	121	430	390
Paddy ..	9½	18	72

Coffee

Arabica Coffee

The experimental stage of Arabica coffee has not yet been completed, and the full permissible acreage during this stage has not yet been reached. Natives unaccustomed to working with coffee are not over-anxious to plant this crop, and no widespread desire for planting is anticipated until moderately substantial monetary reward comes to the first planters. The experimental plantings are still confined to Embu, Chogoria, and Meru in the Central Province, and to the Kisii Highlands in the Nyanza Province.

Robusta Coffee

A quantity of selected "Nganda" seed was obtained from the Sesse Islands, Uganda, and Robusta coffee nurseries were established in representative areas of Nyanza and Central Province. It is hoped that this type of coffee will prove to be a most useful cash crop in the humid, warm, intermediate areas which are just above the cotton ceiling.

Tobacco

Tobacco-growing as a cash crop was commenced in the Butere area of Nyanza Province in 1934 and confined to a small acreage. Various cultural, curing and marketing problems were encountered, but with the continuation of the growing of the crop in 1935 and 1936 these difficulties are being overcome. The 1935 planted crop was sold in February, 1936, and totalled 14,000 lb. The 1936 crop was grown more intensively over a smaller area, and the harvest of 19,200 lb. was sold at prices ranging from 26 to 15 cents per lb., according to the grade; the average price was just under 21 cents, the total cash return to the growers being £200.

Potatoes

Large quantities of potatoes are being grown in the Kiambu, Limuru and South Nyeri areas of the Central Province; the difficulty of obtaining bulk consignments which could be passed by the Grader as fit for export has been overcome by the inspection services. Known exports from the Province were 5,436 tons, whose value to the growers was approximately £10,872.

Vegetables

The growing of European vegetables is increasing in the higher altitudes of Nyanza and Central Provinces and in the Teita Hills of the Coast Province. In Nyanza the mines and

the larger towns form a very good local market, while exports for the Mombasa markets are made from the Teita Hills and Central Province; the latter also supplies a large quantity to Nairobi.

Cashew Nuts

The cashew nut industry is making very satisfactory development in the Coast Province, where the policy is to regard this crop as a most useful subsidiary to cotton. As this is a permanent crop which thrives on the light sandy soils, it should do much to counteract the more lean times, caused by droughted annual crops, which occur periodically at the Coast. In addition, the cashew nut trees make a most useful windbreak, thus reducing the dangers of wind erosion and forming protection for annual crops against the monsoon gales. The 1936 harvest was excellent, and in addition to the preparation of nuts by natives and others for local consumption, some 250 tons have been purchased for factory preparation and export.

Coco-nuts

The palms at the Coast have now recovered from the locust attacks and drought of 1933. Good yields have been obtained, and there has been a distinct revival of the copra trade, assisted by a rise in price during the latter months of the year.

Oil Palms

The industry is still in the experimental stage at the Coast, but, following a very favourable report on a sample of nuts sent to the Imperial Institute, selection work is being carried out on the palms at Kibarani, and a large number of nuts have been planted. The report of the Imperial Institute states that these fruits, obtained from five-year old trees at Kibarani, 45 miles north of Mombasa, were of normal appearance. The nuts were thick-shelled and generally contained one kernel, but in some cases two. The proportions of pericarp and kernels were satisfactory, and both pericarp oil and kernel oil were of good quality, whilst the residual meal was of a normal composition except that it contained slightly less crude proteins than is usually the case with extracted meal from the commercial palm kernel. Shipments of the pericarp oil (palm oil), kernels, or kernel oil would be marketable in the United Kingdom at current prices, and the residual meal would also be readily saleable.

Ramie

Successful trials on the growing of this crop have been carried out at South Nyeri, Fort Hall and Embu, and material is being bulked for issue. This crop should prove to be useful for natives growing in a small way about the huts; it will serve a domestic purpose and provide an export product; the stems are readily hand-decorticated by natives.

Ginger

This crop has been tried in the Fort Hall district, where a high yield of green rhizomes has been obtained.

IMPROVEMENT OF CROP VARIETIES

This very important work now continues almost as a matter of routine. Improvement of crop varieties is accomplished in three ways:—

(*a*) Introductions of what are believed to be superior varieties and strains; these are subjected to comparative trials with existing types.

(*b*) Selection of local varieties: This work includes selection for yield, early maturity, drought resistance and disease resistance.

(*c*) Plant breeding: Up to the present Agricultural Officers in native areas have had little time for carrying out this type of work, but a commencement has been made at the Coast Experiment Station, notably with regard to cotton and cassava.

The more important results are as follows:—

Millets

Eleusine.

The "Bukura" strain is now being grown in many areas of Nyanza Province, and has been introduced into the Coast Province. This has been selected from a local strain, and is a heavy yielder and early maturing; such a type was required in some of the cotton-growing areas, where the millet harvest formerly clashed with cotton planting. A white, high-yielding variety is being selected at Kisii.

Foxtail Millet

At the Coast a strain of this millet possessing a strong awned character has been selected and is now being bulked for issue. This type is a heavy yielder, is drought-resistant, and relatively less prone to ravages by birds. Twenty reselections of heavy-yielding awned plants were made in 1936, and the material will be multiplied in 1937.

Bulrush Millet

In the Central Province this millet, originally imported from Tanganyika, is the most outstanding of recent introductions. It is palatable, heavy-yielding and drought-resistant, while the awned character reduces the amount of loss from birds. The introduction has been considerably improved by further selection.

Sorghums.

In Nyanza, trials with imported sorghums were unsuccessful, but in 1933 two early maturing and high yielding varieties, now known as "Dobbs" and "Kano," were selected locally. These are being bulked and issued extensively. Selection work also continues on the white local "Ik'humba," which is sweet, early, heavy-yielding, low growing, and has a tight panicle which is a most useful quality in times of locust infestation.

In the Fort Hall and Embu districts "Sunrise Kaffir" is now accepted as the best and most palatable variety, and is being selected for resistance to powdery mildew. "Dobbs" has proved successful in Machakos, while "Ikutha" and "Ik'humba" have been selected for the Kitui and Meru districts respectively.

Beans

In the Nyanza Province selections of Canadian Wonder and Rose Coco are being made to suit the local conditions. Very marked results have been obtained in the selection of Rose Coco beans in the Central Province, and an endeavour is now being made to select a high-yielding strain resistant to anthracnose. Similar work is being carried out with the Boston and Painted Lady beans.

Tepary beans, which are very early maturing and drought-resistant, are being introduced with considerable success in the drier areas of the reserves.

At Njoro, strains of Canadian Wonder beans have been selected which are highly resistant to bacterial blight, and issues of these strains have been made to native reserves in addition to European areas.

Groundnuts

Important work has been carried out at Kibarani regarding the selection for immunity to wilt disease. At the end of 1935 four strains appeared to possess 100 per cent resistance to wilt, and 250 individual plant sub-strains were selected for

planting in 1936. Unfortunately, the 1936 results were very disappointing; all sub-strains were attacked, and selection of these had to be drastic. A further 217 re-selections were made and in addition 24 preliminary bulks of certain strains were harvested for planting in 1937.

In Nyanza several varieties of groundnuts are being tried in the hope that the local spreading variety can be superseded by a good early bunch variety for interplanting with cotton.

Simsim

Seed from the 19 strains of a white simsim from Lindi, Tanganyika Territory (selected in 1935), was planted at Kibarani in 1936, and provided 19 small samples at harvest. Most of these appear promising, and preliminary bulking will commence in 1937. At present only the black simsim can be grown at the Coast, and the disposal of the crop is limited to the local oil mills. The production of a white simsim which will grow well will place the industry in a better position to export.

Rice

"Mwanza Sena" has ultimately been adopted for use in the rice areas of Central Kavirondo, since it is a heavy yielder and has a good quality, palatable grain.

In the irrigated areas of the Tana River "Peshawari" is at present the most promising of the introduced varieties. This is a rice of excellent quality, yields well, and matures in three to three-and-a-half months.

Cassava

Selection work at Kibarani has resulted in the production of a variety, "Malindi," which is highly resistant to mosaic disease; it is also a heavy yielder and liked by the natives. This variety is now being multiplied both at the Coast and in the Central Province for issue, while selection work on seedling strains is progressing at the Coast.

Pigeon Pea

A white variety of pigeon pea appears to be the most popular for the export trade, and a strain has been obtained in Machakos district which is being selected for early maturity and yield.

Cotton

Cotton variety trials are proceeding in the three Provinces in order to obtain varieties suited to the local conditions. While several strains are showing great promise, especially

in relation to the drier and hotter areas, they will have to be subjected to more extensive field trials before it is considered safe to bring them into general cultivation and replace the existing cottons.

Seed Farms

Seed farms have been established throughout the Provinces, and are supported financially by the Local Native Councils. Omitting the small bulking plots, the numbers and acreages of these farms are as follows:—

	Number	Total Acreage	Acreage under Cultivation
(*a*) Nyanza Province ..	4	449	291
Central Province.. ..	12	408	300
(*b*) Coast Province ..	3	360	161

The acreage under cultivation includes experimental areas, pastures, trees planted, and fallows.

(*a*) This includes the Bukura Farm, supported by funds from the Department.

(*b*) This includes the Experiment Station at Kibarani, which is also supported primarily by departmental funds, and an area of 30 acres lent for a period of twenty years by Mr. W. G. Lillywhite for the benefit of the people in the Kilifi district.

These farms continue to serve a most important purpose in the production and bulking of improved strains and varieties of seed for issue to natives. They also provide scope for demonstrational work and serve as centres for the carrying out of a limited amount of selection and investigational work. The Local Native Council farms were commenced but some four years ago, and development, both in relation to land and buildings, continues. Systems of rotating the fields are being adopted for the conservation of soil fertility, while the planting of windbreaks and the construction of terraces and broad-base ridges are successful anti-erosion demonstrations. Oxen are kept on all farms, and all waste products of the farm, together with Napier grass litter, are passed through the cattle sheds for the making of compost and manure. On all the larger Local Native Council seed farms, model smallholdings for mixed farming are being established.

In addition to these farms, there are numerous plots throughout the Provinces where varietal, cultural and other field investigations are carried out in relation to the more important crops specific to the areas in the neighbourhood of the plots.

The following were the issues of bulked seeds of improved varieties in the three Provinces during 1936:—

	Nyanza Province	Central Province	Coast Province
	Bags of 200 lb.	*Bags of 200 lb.*	*Bags of 200 lb.*
From L.N.C. Seed Farms and Funds			
Maize	514	1,219	109
Sorghum	155	66	40
Eleusine	66	—	—
Groundnuts	277	8	—
Beans	11	290	—
Potatoes	53	389	—
Rice	3	—	—
Wheat	1	25	—
Rye	2	—	—
Simsim	3	—	—
Awned Bulrush Millet	—	208	—
Foxtail Millet	—	—	6
Victoria Peas	—	29	—
Cowpeas	—	44	10
Gram	—	22	—
Tepary Beans	—	—	10
Pigeon Pea	—	—	8
	Tons	*Tons*	*Tons*
Cassava	—	5	—
Napier Grass	—	241	—
From Departmental Funds	*200 lb.*	*200 lb.*	*200 lb.*
Groundnuts	101	—	—
Victoria Peas	6	10	—
Rice	80	—	—
Wheat	—	2	—
Maize	—	279	—
Beans	—	40	6
Tepary Beans	—	—	3
Foxtail Millets	—	—	13
Rye	—	10	—
Gram	—	7	—
	Tons	*Tons*	*Tons*
Napier Grass	—	15	—

In addition to the above, small quantities of seeds were provided by the Agricultural Department for trial. Large numbers of fruit trees of many kinds were issued, and, in addition to approximately 100 bags of tree seeds, Nyanza

Province and Central Province issued 1,350,145 and 20,167 tree transplants respectively. Extensive areas of wattle were planted by natives in the Central Province without assistance.

Native Agricultural Training

Nyanza Province

Bukura School, North Kavirondo

At this school African apprentices from all agricultural tribes west of Nakuru are indentured for a three years' course of training in agriculture and in the duties of an agricultural instructor. All apprentices who complete this course satisfactorily should be well fitted to become peasant farmers. Agricultural instructors are recruited from apprentices who have been through this course; other apprentices who do not obtain employment as agricultural instructors, or teachers of agriculture at mission and Government schools, are urged to return to their homes and farm on the lines which they have been taught.

The tribal analysis of all apprentices in training during the year was as follows:—

Tribe	Leaving December 1936	Leaving December 1937	Entered January 1936	Total at beginning of year
N. Kavirondo (Bantu)	8	4	15	27
C. Kavirondo (Luo)	3	..	7	10
C. Kavirondo (Bantu)	..	..	1	1
S. Kavirondo (Luo)	2	..	3	5
S. Kavirondo (Bantu)	1	1	1	3
Kamasia	2	..	..	2
Suk	2	..	1	3
Elgeyo	1	..	..	1
Marakwet	..	..	..	..
Nandi	1	..	1	2
Lumbwa	..	1	..	1
Total	20	6	29	55
Agricultural tribes	14	5	27	46
Pastoral tribes	6	1	2	9

Of the 20 apprentices who left the school on the completion of their course, 14 had obtained employment by the early part of January, 1937; 12 were employed as agricultural instructors in their own districts, and two were employed as teachers at the Government African Schools at Kapsabet and Tambach.

The curriculum comprises a three years' course of agricultural instruction, both practical and theoretical. On the practical side, a gradual change-over is being made from instruction on large fields to instruction on smaller peasant holdings such as might be run by natives in the reserves. This part of the training is thus being based on a mixed farming system which will increase the fertility of the soil and prevent soil erosion, while producing an adequate supply of food and cash crops with the help of cattle. In addition, apprentices acquire specialized knowledge, by a course of lectures and practical work, of the culture of food and cash crops, the essential points of animal husbandry, poultry management, elementary horticulture and nursery practice, the value and management of plantations, grading and marketing of produce, etc.

Central Province

Scott Agricultural Laboratory School

Fifty pupils were in residence throughout the year. Nineteen new pupils were engaged at the beginning of the year, and fourteen left at the end of the year on termination of their studies. Numerous inquiries for trained boys have been received during the year, and it has been exceedingly difficult to find enough boys to fill vacant posts. This situation will continue until a new and larger school is established. There are always bound to be a number of pupils who do not respond to their training and in consequence cannot be recommended for posts on completion of their course. It is gratifying to be able to state that the number of such boys is low, however. With the exception of these, the records show that all pupils have been found positions either with the Department, other Government departments, missions, Local Native Councils, or private estates. Reports from employers, without an exception known to this Department, speak highly of the work carried out by ex-apprentices.

Coast Province

In this Province a proper school for the training of native agricultural instructors does not yet exist, but apprentices are selected and are given what is essentially a practical agricultural training at the Coast Experiment Station. The Coast Province (with the exception of the Voi district) is not so well equipped with schools as the other two Provinces, hence the material from which to select apprentices is relatively poor, and this lack of education makes the process of

agricultural training somewhat difficult. It is hoped, however, to establish an agricultural school at Kibarani in the near future.

General

As it is desired that agricultural instructors should have had a comparatively good general education before they are engaged, it has been attempted to recruit boys who have finished their primary education.

Unfortunately, it has not been wholly possible to accomplish this, as at the present moment educated natives do not appear keen to take up agriculture as their calling, and prefer clerical, teaching, and other literary employment. Therefore it has been necessary in many cases to recruit boys who have not completely finished their primary education and to continue this education during, but separately from, their course of agricultural training. It should be noted, however, that the standard of education of the boys being recruited now is considerably higher than it was a few years ago; also boys of a much better class are now being sent out from these agricultural schools; they are much more efficient and are able to carry greater responsibility when they commence their work in the reserves or on private estates.

Smallholdings

The value of mixed farming on smallholdings is being increasingly emphasized, and the subject forms an important part in the curriculum at Bukura and Scott Agricultural Laboratories, where model holdings are worked by selected apprentices. At the Jeanes School, Kabete, also, a smallholding is used for the instruction of teachers and others in residence. Smallholdings, operated independently by selected natives, are now in course of establishment at all larger Local Native Council Seed Farms.

INVESTIGATIONAL WORK, 1936

Coast Province

Mr. Milligan, in his "Cotton Inspection Note" (page 21), states:—

"The most important recommendations for this area are:—

1. Trials of varieties at the Experimental Station of Kibarani, and the improvement of the station itself.

2. Investigation with regard to the insect position, more especially the stainers and the pink boll worm.
3. As regards variety trials, an extension to a suitable and more uniform area is required at the Kibarani Station.
4. The officer in charge should receive special training in the work ,as such trials must include an examination of staple. . . ."

These recommendations have been adopted and action with regard to all points mentioned has been taken. The report on investigational work with cotton and other crops at the Kibarani Station which follows has been prepared by the Provincial Agricultural Officer.

The proportion of the total area under crops at the Kibarani Station devoted to experimental work has been considerably increased during the year. Cotton investigation has been much enlarged, and in addition the programme of soil fertility experiments has been arranged on a bigger scale than hitherto.

Cotton

Trial of Kibarani-grown U/4 *and* U/4 *Derivatives.*—The following U/4 types grown at Kibarani in 1935 were under trial for a second time: 955, 921, 9355, 9264, 9292, 998, 920, U/4, U/4/4, and 9243.

Regular observations on the behaviour of each were made, the more important of which may be summarized as follows:—

955.—An early variety, producing a small bushy plant which fruits well; staple rather poor.

9292.—Nice type of plant, but yields were a little disappointing by comparison.

998.—Makes a good growth and fruits well. In past seasons has done well, and is probably the best variety. Appears to hold its bolls in spite of rather dry conditions. Ginning percentage good.

920.—Yield very disappointing after its success last year. Plants made good growth, but appeared susceptible to dry weather, and a fair proportion of the crop was shed.

U/4/4.—Nice type of erect plant, with good laterals; has yielded well.

9243.—A semi-erect type with good yield. Generally growth was better than last year.

The season was not at all favourable, as conditions prior to the maturity of the crop were very dry. Nevertheless, actual yields were fairly good.

It is again evident that a U/4 type of cotton will probably prove to be the most suitable for Coast conditions.

One-quarter acre plots of each variety were planted. Their yields (estimated per acre) and ginning percentage are given below:—

Variety	Yield per Acre (*Seed Cotton*)	Ginning Percentage	Yield per Acre (*Lint*)
	Lb.		*Lb.*
9243 ..	833	35·5	295
U/4/4 ..	820	35·9	294
998 ..	810	37·4	303
9355 ..	780	35·7	279
955 ..	758	35·4	269
9292 ..	715	34·6	248
U/4 ..	713	35·0	250
921 ..	693	35·6	246
920 ..	691	35·5	245
9264 ..	667	34·6	231

Bulk selection of plants of good type from seven of the varieties were made, in addition to a number of plant selections.

Varieties Direct from Barberton.—The following varieties were tried: 955, 9264, 921, 920, and 052. Unfortunately, the seed was late in arriving, and the young cotton struck a dry spell soon after planting. From this it never really recovered, and growth was rather disappointing.

Observations on the crop were made, and the seed obtained will be used for a further trial next year.

Bulk selections from each variety and some single plant selections were made.

Trial of Varieties from Shinyanga.—Small plots of the varieties 955, 998 and 920 made good growth in spite of dry conditions. Their superiority over the new Barberton seed may be accounted for by better acclimatization.

Trial of N.17 *and* U/4 *Derivatives at Vitengeni.*—Alternate plots of N.17, 9292, 9243, 955, 920 and 921 were planted at Vitengeni in the dry area of Kilifi district. The N.17 seed

came from the same source as that used throughout the district, whilst seed of the U/4 derivatives was obtained from the 1935 Kibarani crop.

It was unfortunate that the first planting was done under difficult climatic conditions and an extensive second sowing was necessary later.

At the end of July a relatively high incidence of stainers caused a large proportion of the first flush to be discoloured. In addition, prolonged strong winds and a continuance of dry conditions caused much boll-shedding. The following observations were made:—

(*a*) N.17 plants made the most growth, but did not crop proportionately.

(*b*) Shedding was more prevalent on the N.17 plots.

(*c*) 920, as at Kibarani, made good growth but yielded poorly.

Owing to very adverse weather conditions the plots were badly droughted, and comparisons were very difficult. It is evident that a U/4 type is likely to be much better than the local N.17. The former produces small compact plants which fruit heavily, as opposed to the open N.17 type with much vegetative growth and long internodes.

Observational Plot, N.17 *and* U/4 *Derivatives.*—Alternate rows of N.17 and 920, 998, 921 and 9243 and 955 were planted at Kibarani for the purpose of observing the incidence of jassid on the U/4 varieties, as compared with N.17.

N.17 appeared most susceptible to jassid damage, and of the U/4 derivatives 921, 9243, 955 were the least resistant.

N.17 was the most mixed type, and the rows of this variety could be picked out immediately by their irregular appearance.

Soil Fertility Experiments

Maize Tillage Experiment.—A statistical experiment laid out in the form of nine randomized blocks, to determine the effect of four treatments mentioned below on the yield of maize, gave a significant result. Burying of organic matter gave higher yields than the other treatments:—

Treatment A—Weeds and residues removed completely.

Treatment B—Weeds and residues burned evenly over the surface.

Treatment C—Weeds and residues buried on the flat.

Treatment D—Weeds and residues buried in 6 ft. ridges.

Treatments C and D were significantly better than the other two. Treatment D gave a higher yield than Treatment C, and Treatment A gave a greater yield than B, but neither difference was significant.

Ridging, however, possesses other advantages, such as better control of soil wash, and greater ease of burying *shamba* waste.

It is interesting to note that, as expected, the burning of all weeds, rubbish, etc., which is a native custom throughout the coastal region, appears to depress the yield of maize.

After harvest the ridged plots were levelled and the whole area was planted with Mauritius beans. The quick growth of the cover crop and its healthy appearance on the original ridged plots was very remarkable.

Green Manure Experiment.—The following treatments were laid down during the short rains of 1935:—

Treatment A—Cowpeas: turned in green at time of flowering.

Treatment B—Cowpeas: cropped and plants turned in.

Treatment C—Cowpeas: cropped, plants burned and turned in.

Treatment D—Foxtail millet.

Treatment E—Grass fallow.

All plots were ridged before being planted with maize in the 1936 long rains.

Results were inconclusive, and the experiment is being repeated.

Rotation Experiments.—Two trial rotations were laid down during the year:—

	First Rotation	Second Rotation
1st Year	Sorghum interplanted with cowpeas ..	Sweet potatoes
2nd Year	Cotton	Pigeon pea interplanted with Eleusine
3rd Year	Pigeon pea interplanted with Eleusine millet..	Cassava
4th Year	Pigeon pea (2nd year)	Cassava (2nd year)

Coco-nut Experiment.—Coco-nuts, when grown with Mauritius beans as green cover, continue to show a healthier state of the palms as compared with the control plots.

The trees are only just commencing to bear, and as yet no further observations are possible.

Soil Renovation Experiment.—A 4 x 4 latin square, to investigate the relative value of (i) grass fallow, (ii) pigeon peas, (iii) Napier grass, (iv) Mauritius beans, in restoring fertility to worn-out land, was commenced in the short rains of 1935. This experiment is due to be planted with maize as an indication in the 1937 long rains.

Other Experiments

Sorghum Variety Experiment.—A statistical variety trial with Boganhilo and Dwarf Hegari sorghums showed that the difference in yield was decidedly significant in favour of Boganhilo.

Dwarf Hegari, however, is more popular with natives, and is a useful short-term crop. For these two reasons it is being retained.

Foxtail Millet

Spacing Experiment.—The experiment consisted of five randomized blocks. A constant spacing of 6 in. within the row was adopted. Inter-row spacings were varied at 2 ft., 2 ft. 6 in., and 3 ft. The stand was very irregular, and final yields gave no significant result.

Miscellaneous Crops

The white haricot bean was tried, and it appears that this may become a useful saleable bean for natives when the optimum time for planting is discovered. In the past year a certain amount of discoloration of the beans was evident.

Fourteen varieties of cassava, obtained from Amani, have done remarkably well, and most of them seem resistant to mosaic disease.

Trials of other crops included cover crops, fodder crops, and several varieties of linseed.

Central Province

Unlike the Coast Province and to a certain extent the Nyanza Province, Central Province has no definite experimental station, and investigational work has to take place where time will permit on seed farms and plots. This system is most unsatisfactory, as extension work claims the major part of the agricultural officers' time, and they cannot be

expected to carry out investigational work which, if accurate results are to be forthcoming, requires much time and study. The Province therefore is in urgent need of a fully equipped experimental station, together with the whole-time services of a qualified officer.

Cotton

Cotton is a crop of only three years' standing in the Central Province, and its cultivation is fraught with many problems, the chief of which are the cold season experienced in July and August, and the incidence of stainers.

As the result of numerous trials the optimum planting dates are during April for the higher zones and October-November for the lower zones.

Spacing Trials.—These have shown that 2 ft. x 1 ft. spacing produces the highest yield.

Ratooning Trials.—Ratooning of April-planted cotton for a carry-over crop has not been successful.

Interplanting Experiment.—Present results indicate that interplanting of cotton with legumes at suitable spacings, which have yet to be determined, will prove highly successful.

Stainers.—Careful counts are being made weekly to discover the relative incidence of stainers throughout the cotton area.

An experiment to find out whether poultry kept the incidence of stainer in check without damaging the cotton plants was carried out on the Fort Hall seed farm in January, 1936. The cotton was planted in rows 3 ft. apart and the plants 1 ft. apart in the rows. Four plots, each 20 yards by 5 yards, were pegged and fenced. Two plots were kept as controls, and on the remaining two plots eight full-grown poultry were allowed to feed daily from 7 a.m. until 6 p.m. for one week.

The results of the experiment showed that the birds did keep the incidence of stainer in check, and that they did no harm to the cotton plants as long as stainers were present, but as soon as the stainers were consumed the birds commenced damaging the cotton plants.

It would appear from the above that poultry could quite profitably be permitted to feed in native cotton *shambas* when stainers were present, and if allowed to feed on the range system it is more than likely that birds would do little if any damage to cotton plants.

Variety Trials.—The following varieties are under extended trial: N.17, and three U/4 derivatives—U/4/4/2, 052 and 998.

Samples of seed cotton representative of the Fort Hall (early and late), Embu and Meru areas have been sent to the Imperial Institute for examination and report.

Maize

Selection of Muratha maize for yield and early maturity is carried out in all districts, with the exception of Kitui. Excellent results are being obtained from this work, the yield of the crop having been doubled during the last six years.

Tobacco

An investigation into the possibility of growing flue-cured tobacco has been commenced. The following varieties are under trial: Golden Dollar, Cash, White Stem Orinoco, and Joyner.

Sweet Potatoes

Nine local varieties of sweet potatoes have been subjected to yield tests. It has been found that the variety known as "Buganda" produces the heaviest yield of tubers, and at the same time gives an excellent yield of fodder.

Miscellaneous Crop Trials

In addition to the above, numerous other varieties of crops have been dealt with on the various Local Native Council seed farms and plots, and useful information has been obtained relative to the growing of varieties and strains of crops best suited to the varying soil and climatic conditions.

Nyanza Province

Certain statistical investigational work is carried out at Bukura, while maize variety experiments were also conducted at Kakamega and Maseno. Cotton variety trials were carried out statistically on the Kibos plot.

Cotton

Spacing Trials.—Numerous spacing trials were carried out throughout the Province. The varieties used were N.17 and S.P. 20, and the spacings 4 ft. x 1 ft. 6 in.; 3 ft. x 1 ft. 6 in.; 3 ft. x 1 ft., and 3 ft. x 6 in. Observations and yields indicate that the 4 ft. x 1 ft. 6 in. spacing is too wide. There was no significant difference between the 3 ft. x 1 ft. 6 in. and 3 ft. x 1 ft. spacings, which in most cases proved better than the other two. In two trials with S.P. 20, the 3 ft. x 6 in.

spacing gave the highest yields, and it is probable that, as this variety has a more upright habit of growth compared with N.17, closer spacing might result in heavier yields. The experiments are to be repeated.

Variety Trials.—A number of comparative trials have been carried out with N.17 (the cotton being universally grown in the Province) and S.P. 20. Unfortunately, in most cases the S.P. 20 germinated badly, and plots had an uneven stand, but results indicated this variety to be a potentially heavier yielder than N.17, with somewhat earlier maturity.

Interplanting Trials.—Interesting results were obtained from an interplanting trial carried out at Kibos. The variety of cotton used was N.17, and the legumes were tepary beans and groundnuts. Early in the season the tepary beans had a detrimental effect ou the growth of the cotton, especially where there were two or three rows interplanted. Cotton growth continued poor until the beans were harvested, when, after a small shower, their recovery was rapid. Groundnuts, except where two rows were interplanted, did not affect the yield or maturity of the cotton.

Maize

Variety Trials.—In order to determine the most suitable variety of maize for the main growing and exporting areas of Nyanza the following varieties were subjected to statistical trial at Kakamega, Bukura and Maseno:—

Muratha,
Kitale Flat White,
Njoro Flat White,
Nakuru Flat White.

As a result of this trial it has been decided to concentrate on the Kitale strain of Flat White as being the most suitable and the heaviest yielder.

Persian Millet

This crop has been tried at various centres, and has grown well in the drier areas. The crop is very susceptible to attack by birds, and is somewhat difficult to harvest, as it matures unevenly. The period of maturity is $3\frac{1}{4}$ to $3\frac{3}{4}$ months.

Soya Beans

The "Busa Dark" soya bean has grown well, but has not yet set seed.

Fodder Crops

Hubam clover shows considerable promise at Bukura, and is now to be grown on the smallholding.

Leguminous Green Manures

At Bukura the best long-term crop has proved to be Black Mauritius beans, while the most satisfactory short to medium term crops are *Dolichos lablab, Crotalaria axilaris, Crotalaria Kirkii,* and ordinary field pea.

Soil Fertility Experiments

Experiment I.—The object of this experiment, which was commenced in 1935 and is to be of two years duration, is to test the effect on soil fertility of separate versus mixed planting; weeds versus clean weeding; ploughing and application of compost versus cropping without either treatment. The following are the treatments used and the yields of maize (this being the indicater crop):—

Treatment prior to planting maize	Yield of maize lbs.
A. Control—Maize followed by bare fallow	295·00
B. Maize followed by bare fallow and compost ..	449·25
C. Maize and beans followed by green manure ..	278·00
D. Maize clean weeded followed by weed fallow ..	279·25
E. Maize and beans followed by weed fallow.. ..	253·50
F. Maize and beans followed by green manure and compost	406·75
G. Beans followed by green manure	278·25

There is no significant difference between the control and the other treatments with the exception of B and F, and here the large increase in yield is doubtless due to the application of compost.

Experiment II.—This is a similar experiment to No. I above, but is running for three years and is elaborated to include pasture and Napier grass ley treatments. Maize as an indicater crop will be planted on the various treatment plots in 1937.

Experiment III.—This experiment is of seven years duration, and was commenced in 1935. It is designed to test the effects on soil fertility of planting mixed crops in strips year after year versus haphazard mixed planting for three years followed by bush or ley (all the foregoing in customary native rotation) versus a modified and possibly improved food and cash crop rotation, both including a ley and without a

ley. Thus, in effect, existing native planting and cropping methods are tested against a simple mixed farming cropping system and against other methods of planting which do not follow the native custom, while the value of the inclusion or exclusion of bush or ley is tested in each case. While interim results have been recorded, it is too early to draw conclusions from this experiment.

Soil Fertility and Mixed Farming

The problems of soil conservation and the maintenance of soil fertility are related primarily to husbandry methods, and no superficial measure will have a lasting effect. Under the old native farming system soil fertility was more or less maintained by an adequate "bush" fallow, but as production increases and more land is brought into cultivation the period of fallow in the heavier populated areas is shortened and may not allow sufficient time for rejuvenation. The establishment of mixed farming is therefore of supreme importance, and it is hoped that in the very near future the existing model smallholdings at the training schools and on Local Native Council seed farms will induce cultivators to adopt this system with greater rapidity. The present system of land tenure is at present a deterrent to the rapid establishment of smallholdings, but in the initial stages a simple method of maintaining soil fertility can be developed without these. Large numbers of stock are not essential for the making of plentiful supplies of compost, and it is this compost method of fertilizing the land that must be resorted to with all possible haste. Campaigns for the making of village compost have occupied much of the time of all field officers, and in the Central Province alone, where, in most parts, cattle are not kept on the holding, some 100,000 compost pits have been brought into use, while the number of natives who have made grazing paddocks and who are keeping animals on their holdings is 1,160.

The question of crop production and soil fertility was very fully discussed in my report for 1935, and reference should again be made to this.

Implements

The work of production of suitable crops for native areas becomes of no avail unless all factors relating to the best economic use of the soil are explained to the producing population. A very important factor is the proper cultivation

of the soil by economic methods, and the new challenge for increased production and the desire for greater wealth has brought the question of agricultural implements under careful consideration.

In many parts of the Provinces the topography of the country and the small type of field cultivated is such as to disallow the use of animal-drawn implements; but large areas occur which are flatter, and, where the population is less dense, there is greater scope for the developing of larger unit fields by means of such implements. In the first type of country mentioned—chiefly in the Central Province—valuable work has been done with regard to the replacing of the old-fashioned knives and digging sticks by hand hoes which enable a much more thorough cultivation to be effected, while in the Nyanza Province and parts of Ukamba Reserve the increased use of ploughs has been very marked. It is estimated that, in Kisumu alone, at least 3,000 ploughs were sold in 1936. This is a development which is giving anxiety, and the policy of the Department is not to encourage ploughing by a native who cannot or will not adopt measures for prevention of soil erosion.

Progress of Grassland Work in Native Reserves

The pasture requirements of native agriculture in the high-altitude, moist type of country and in the intermediate type of country at a somewhat lower altitude are similar in the main to the requirements of the corresponding European areas, and the same experiments are designed to provide the necessary information. Already trials are being carried out at a number of native centres with the more promising pasture species, with a view to the utilization of these types in native smallholdings.

The main improvement necessary in the high-altitude country occupied by such tribes as the Kikuyu is the development of small areas of intensively managed Kikuyu grass in place of the less desirable types which often exist as the result of reduced soil fertility.

The work connected with the intermediate lower altitude moist areas consists of the trial of various pasture types for sowing in the crop rotations in place of the "bush" fallow.

In the extensive dry areas occupied by pastoral tribes, such as the Masai, Turkana and Samburu, attempts are being made to introduce simple methods of controlled movement

of the herds in order to provide for the seasonal resting of areas in rotation and production of seed of the herbage species. A comprehensive scheme of grazing control based on a study of the vegetation has recently been adopted for application to part of the Ukamba area.

A considerable part of the time of the Agricultural Officer in Charge of Grassland Improvement has been employed during the year in making valuable surveys and preparing reports connected with a scheme of development for the Masai Reserve. The survey was carried out in conjunction with a Veterinary Officer. In the western Masai area the preliminary ecological survey dealing with climate, vegetation and soil shows that it is eminently suitable for live stock rearing, and has given a basis for planning the proper management of the natural pastures. The major deficiency existing in the lower area is permanent water supplies, which will be a limiting factor to the economic use of the area until these are supplied. In the higher park-like regions a deficiency exists in the form of an inadequate supply of soil minerals for the proper nutrition of the stock. These two deficiencies give rise to seasonal migrations—to the lower areas during the rains in order to gain access to salt-licks while pasture and water is plentiful, and returning to the higher areas when the grazing and water supplies in the lower ones are unattractive, in the dry weather. Provided these two limiting factors can be overcome, each area would be capable of carrying a considerably larger number of stock. In the higher areas development should proceed along the lines of a mixed farming system which would entail a more settled mode of life on consolidated individual holdings. In the lower areas the extensive control of grazing in the drier plains must be the aim, at first on a commercial basis and later developing towards individual or family holdings as the distribution of water supplies is improved.

The eastern part of the Masai Reserve lies at lower altitudes having less favourable moisture and grazing conditions. The whole of this portion of the Reserve is subject to very light grazing on a nomadic basis and water supplies are not permanent, and consequently, even in the limited moister areas, full use cannot be made of the grazing owing to lack of water. Therefore the first move towards development will consist in improving the distribution of water in the better grazing areas and gradually extending development to the

adjacent better portions of the drier types of grazing. The former would be used during the dry weather and the latter during the rains under controlled migration.

A more detailed account of these surveys is to be found in the report of the Grassland Officer in Volume II.

Soil Erosion

Much has been written in the past concerning the dangers of soil erosion and the methods by which it can be prevented or arrested, and it is not proposed to enter this year into details.

The subject has received the constant attention of all field staff and active propaganda and instruction, accompanied by demonstrations relating to soil control, has been given to natives in all districts. Land conservation and utilization committees have been formed in certain areas for local district co-ordination of the work.

Projects of reclamation must, for large operation, await substantial funds; but small projects have been undertaken in the Central and Nyanza Provinces, and in addition the reafforestation which is taking place by plantings in individual native holdings is most gratifying, particularly the wattle planting in the Central Province, which may now be said to have more than made up for the deforestation by natives which has occurred since their occupation of this land.

Native Produce

Inspection and Marketing Services

The Carnegie Trust made a grant early in the year for the specific purpose of the appointment of a Marketing Officer for native produce. Mr. C. O. Oates, Agricultural Officer in Kenya, was appointed to the post, which is a purely temporary one, his place being taken by a local appointment. This action on the part of the Carnegie Trust is very much appreciated by the Department. The report for 1936 which follows under this heading has been prepared by Mr. Oates.

The appointment of the Marketing Officer was made as from the 1st March, 1936. The duties of the post cover both the Native Produce Inspection Services and the Native Produce Marketing Services, but additional work has been taken on, as will be related in this report. Headquarters for the services were established at head office in Nairobi.

During the period 1st March to 31st December, 113 days were spent on travelling duties, the main activities for this falling under the following heads:—

(*a*) Survey of Inspection Services, establishing of fresh centres, improvement of equipment, taking observations for revision of the Native Produce and Inspection Rules.

(*b*) Implementing the Rules of the Native Produce Marketing Ordinance; assisting in the organization and bringing into operation of the markets at the fixed centres.

It is to be understood that this field work was by way of assistance to the Agricultural Officers in the areas concerned, who bore the brunt of the organization, and of assistance as well to the Deputy Director (Plant Industry) in the centralized direction of the work which is necessary during the early years.

Apart from field work, assistance was given at head office in drafting the Rules and in attending to correspondence for the above services. In addition, head office work consisted of the following:—

(*a*) Investigation of both local and overseas markets for native produce;

(*b*) Assisting in the preparation of the Kenya exhibit for the Johannesburg Exhibition and attention to correspondence resulting from the Exhibition.

(For the European farming community assistance was given in the organization of a Fruit Growers' Association by acting as temporary secretary.)

Inspection Services

Previous to the introduction of compulsory central inspection, this service consisted only in occasional itinerant inspection for the enforcement of the rules prohibiting the purchase or sale of wet, mouldy or adulterated produce, specified. The progress was slow and the reward was inadequate, for the native received no higher price for well sorted produce than for mixed produce. (Cotton has always been an exception, from the early days when two qualities (clean and dirty) were laid down and the natives educated up to sorting their pickings, principally by means of the offering of a substantially higher price for the clean cotton.)

In the Central and Nyanza Province there has been a rapid change from this state of affairs in the last few years with the introduction of compulsory central inspection.

At the inspection centres all produce of specified kinds which does not meet the rules forbidding the sale of inferior produce is rejected, and the native is given an opportunity of re-sorting the produce and offering the sound portion for a second inspection. This is having a highly educative effect, not merely in inducing the native to sort the produce at his own home before bringing it to the inspection centre, but in teaching him the necessity of planting the best available seed.

All potatoes brought to the inspection centre are sorted mechanically into the export grades. Maize is put through a sorter and cleaner, and if the parcel shows an excessive percentage of discoloured grains the native is made to pick these out before re-submission for inspection. In almost all cases of the individual load, it is the woman who brings the load for inspection, and the assemblage of native women, sitting down on the clean floors provided (in most cases, cement floors) is a happy gossiping one; their visits to market are infrequent, and they enjoy the opportunity of a long and leisurely conversation.

Beans are passed either as pure variety or as mixed varieties, the option being given to the native, who is informed of the higher price offered by buyers for the pure variety. (The information is now no longer necessary.)

A ticket is given for produce which has passed the inspection, and no person may consign the specified produce out of the declared area unless he is in possession of this inspection ticket.

In the Central Province, with the institution of marketing organization, the traders who buy the produce at the fixed market centres away from the inspection centres require the sellers to sort the produce before purchase, as the produce has to undergo the inspection when brought in for sale by the trader to the wholesale buyer. The inspection centres are situated at all distributing points through which the produce must pass for consignment out of the area.

Central Province

In the Central Province an opportunity for the inception of the system was provided in 1933 in conjunction with the strong efforts to improve the quality of native-produced wattle

bark. The Agricultural Officer in charge of the Province (Mr. Leckie) organized a system of central inspection, to which the marketing of the bark lent itself, for the bark is purchased mainly at central points on the Railway. The system was shortly made compulsory, and proved a great success. It was then decided to extend it to maize, but delay in securing the necessary legislation led to successful efforts for voluntary co-operation, at certain main points, with the buyers, who agreed to purchase none but inspected maize. The success was immediate, and the Department received numerous requests from wholesale buyers to extend the system to other native produce. At the present time the compulsory central inspection service covers wattle bark, maize, beans, and potatoes throughout the Province, with the exception of the remote district of Kitui. The guarantee which the system provides of sound, clean produce (in certain cases graded) has enabled the large buyers, such as the Kenya Farmers' Association (Co-operative) Limited, to establish a buying organization in the native reserves of the Province, both for purchasing produce for export and for stabilizing local prices. (Formerly the large native unexportable surplus depressed prices well below export parity in most areas.) This result of the services receives further reference under the heading "Marketing Services".

Nyanza Province

The itinerant, occasional inspection of native produce was also previously practised in Nyanza for some years and with substantial success, but the Agricultural Officer for South Kavirondo (Mr. Gaddum) found an opportunity of instituting central inspection before sale of all produce of certain kinds brought into Kisii. Later, after the success in the Central Province and at Kisii, compulsory central inspection under legislation was extended throughout the Nyanza Province, with excellent results. In this Province the service covers maize, beans, groundnuts, gram, and sesame, and equipment is provided for cleaning. The number of inspection centres is much larger than in the Central Province, for they are not confined to the main distributing centres; with the educative effect of a few years of inspection, it will be possible to reduce the number of centres considerably and practically to confine them to main consignment points. At the present time check inspections are made at consignment points. In this Province as well, the Kenya Farmers' Association has been enabled to enter the native maize market and to raise the price to export parity.

Rift Valley Province

In this Province inspection is at present confined to maize and to the Nakuru district, and is linked up with organized marketing, each inspection centre being a fixed market centre as well. The native maize is produced entirely by squatters on European farms and in forest reserves. The service was instituted only at the end of the year, after the harvesting of the 1936 crop. Here, again, the Kenya Farmers' Association has become a large buyer of native maize.

AMOUNTS OF NATIVE PRODUCE PASSING THROUGH THE INSPECTION CENTRES IN 1936, IN THE CENTRAL AND NYANZA PROVINCES

	Central Province	Nyanza Province
	Bags	*Bags*
Maize and Maize Meal ..	180,406	209,293
Legumes	32,951	34,210
	Tons	*Tons*
Potatoes	5,436	..
Simsim	..	2,938
Rice	..	250
Wattle Bark (Dry) ..	11,979	..
Wattle Bark (Green) ..	8,309	..

Marketing Services

The Native Produce Marketing Ordinance was enacted in August, 1935, and, amongst other provisions, gave authority for the organization of marketing of native produce by the creation of fixed market centres in declared areas and prohibiting the sale of specified produce (save for local consumption) except at the fixed centres.

Earlier efforts for the marketing organization consisted in inducing Local Native Councils to erect godowns and to appoint an agent for the purchase of produce brought to the godown by natives at a price which represented fair market value less a 5 per cent commission and cost of purchasing. For some years this was confined to the Central Province, and ten godowns were erected at principal distributing centres in the Province. It has now been extended to the Nyanza Province. These Local Native Council godowns have become a valuable aid to the marketing organization in the Central Province. In Nyanza, the Native Produce Marketing Ordinance has not yet been applied; nevertheless, the godowns are proving most useful, by permitting, as in the Central Province, a large buyer to purchase direct from the individual native

or from a native trader, thus eliminating one or more middlemen. There is no monopoly involved in this system, for the agent is purchasing in competition with other buyers in the area; on the contrary, it has intensified competition.

Central Province

The former practice was for the native traders, a large number, to traverse the reserves, visiting individual holdings or waylaying women on their way to market, and purchasing the produce at a price well below fair market value. The application of the Marketing Ordinance has completely put an end to this practice. All produce of the specified kinds for sale, except that sold by one native to another for purely local consumption, is now brought to the gazetted market centres or to trading centres; in the former, licensed native traders have demarcated plots and approved stores; the price for the day offered for each type of produce is displayed on a board, and a standard half-bushel measure is used by the buyer. All trading centres are market centres, and the same rules apply to these as to the fixed centres within the reserves. The Local Native Council godowns are at certain of the trading centres.

In the market centres in the reserve the number of plots made available is restricted to the number of native traders considered sufficient to deal with the volume of produce normally coming into the particular market centre. Plots for each type of trade are situated sectionally; the traders buying specified foodstuffs (maize, beans and potatoes) are in one section, those buying wattle bark in another. (The inevitable retail shops and coffee shops are also situated separately.)

This organized marketing in the Central Province has made an excellent start in 1936, and promises to be of the greatest value for the native producer. At present it covers wattle bark, maize, beans and potatoes in all except the Kitui district, though proper application in the Kiambu district is yet to come. The inclusion of other products is now under consideration. The number of fixed market centres and trading centres is such that in most cases no native has to walk more than five miles to a market, and the average walking distance is approximately three miles. The service has been highly gratifying to the natives, for now their produce can be taken to a competitive market within a few miles of their homes and they are no longer the prey of the itinerant buyers. Fair market value has become an established principle in the sale of this produce through creating these several foci of produce collection and competitive buying.

Rift Valley Province

The Native Produce Marketing Ordinance was applied to the Nakuru district of the Rift Valley Province late in 1936 with the institution of the inspection services in that district. The marketing organization, as with the inspection, is confined to maize produced by native squatters, of which some 200,000 bags are sold annually.

On the western side of the district a number of trading centres provided a fairly ready outlet for the disposal of maize. On the eastern side, however, there are no trading centres, and maize had been bought by itinerant traders, often at night. In many cases the natives were badly cheated, and when farmers heard lorries transporting maize at night they became suspicious, by no means without reason, that their own maize was also being sold. The establishment of several market and inspection centres has given the squatters definite places to which to bring their maize, where they know a fair price is paid and where competition is strong.

Nyanza Province

The Native Produce Marketing Ordinance has not yet been applied to Nyanza, and marketing organization for the staple crops is confined to the provision of Local Native Council godowns and the appointment of an agent to purchase produce in competition with other traders. Three of these godowns exist at the present time, at Yala, Luanda, and Broderick Falls, but at the last the godown is rented by native maize-growers who sell their maize collectively to one buyer on the somewhat unsatisfactory system of an initial and a final payment. The factor in the Province which may for a time require more modification of the general system of organized marketing to that of the Central Province is that of a large class of native trader (except in a very thickly settled part of North Kavirondo) to purchase at fixed centres at numerous points within the reserves.

In connexion with the small pioneer tobacco industry in the Butere area, the marketing of the leaf was organized in 1936 by confining purchasing to one fixed centre and to two purchasers, competing with each other.

Old and New Methods Compared

Under the old method the native producer either waited for a buyer to come to the village, or was intercepted on the

way to market by a buyer, or carried the heavy burden of produce, usually a considerable distance, to a native market or a trading centre. Certainly in most cases the native did not get fair market value for the produce. The produce itself was not of uniform quality and contained good and bad qualities mixed; the price was based on the inferior portion of the produce and, in fact, even when a good parcel was offered, no higher price was obtained than for a mixed parcel.

Under the new method the native is aware that he is not able to sell his produce to a trader if it does not reach the standard set by the Inspection Rules, or sell it to him except at a recognized market. In the initial stage of the inspection service, on rejection of an inferior or mixed parcel, a native was obliged to sort it out; now, in most cases, he has learnt to do this at his hut before taking his produce to market. In the Central Province, where markets have been established under the Native Produce Marketing Ordinance, the buyers will not accept the produce unless it is of the standard which will pass inspection, since they would have to clean or sort it themselves. On reaching the market with his sound produce of uniform quality the native sees the prices marked on the boards displayed outside each store, and can choose one among a number of competitive buyers. The buyer, when he has purchased a sufficient quantity for consignment, transports this to one of the large centres on the Railway, where the consignment is inspected at an inspection centre. After he has obtained an inspection ticket he has a choice amongst a number of large buyers, usually Indian buyers, for the sale of the produce.

There is no doubt now of the success of this system in the Central Province, and from the beginning it has run with remarkable smoothness; this has been due largely to the fact that, so far as marketing itself is concerned, the native has been accustomed for generations to take his surplus produce to a market—the practice amongst native traders, prior to the introduction of organized inspection and marketing, of traversing the reserves for produce, has only begun a few years ago—and the natives are well pleased with the establishment of a very much larger number of market centres for their produce, so that they have but short distances for carrying it. Native traders themselves welcome the system, as saving them a great deal of trouble and enabling them to purchase larger quantities individually, although at higher prices.

In the Rift Valley Province the inspection and marketing of native squatter maize has also been running quite smoothly, although there have been some evasions by lorry-owners who appear determined not to give up their practice of former years without some resistance; the detection of this is giving a good deal of trouble to the inspectors, who are also supervisors of the markets.

Nyanza has been awaiting the results of the marketing system in the Central Province before the application of the Native Produce Marketing Ordinance to the Province. A great deal of work has, however, been done by Administrative and Agricultural Officers in preparing the way for the application of the Ordinance, particularly by the creation of a larger number of ordinary native marketing centres. The inspection service in Nyanza has been exceptionally successful, and, as in the Central Province, has been warmly welcomed by the purchasers of native produce. The produce in Nyanza was, before the inception of compulsory inspection in the Colony, somewhat superior in quality to that of the Central Province, due to rather better climatic conditions for the particular crops, so that Nyanza had not so far to go as the Central Province in bringing the quality up to a high standard.

The system of compulsory central inspection was begun before the organized marketing under the Marketing Ordinance, and the former service alone had a remarkable effect in improving the price to the native, for the large export buyers of produce were able to purchase native produce with confidence that the deliveries to them would be of sound, exportable produce of uniform quality. Previous to the inspection services, no native maize was exported beyond African ports, for none of the large buyers would purchase it for export due to the unsound or irregular quality. As soon as it became clear that native maize leaving the reserves was uniformly dry and of an adequate standard of purity, the Kenya Farmers' Association, which exports over 90 per cent of the country's surplus maize, set up organizations in the native areas, assisted by this Department and the Administration, for the purchase of native maize, and in the first season exported 50,000 bags. Similarly, the purchase of potatoes for export was considerably increased, buyers being both the Kenya Farmers' Association and certain large Indian exporters to Bombay. The demand from South Africa for Kenya native-produced beans became greater with the improvement in quality and uniformity, and a more or less

well-organized trade is now in existence in this produce between the two countries. In Nyanza the improvement in the quality of groundnuts and sesame has led to a considerably greater demand at higher prices.

It is not possible to make calculations as to the increased wealth resulting to the natives from the Inspection and Marketing Services, since the rise in the prices of commodities which has taken place in the last six months or more has been a general world improvement, but before this rise set in there is no doubt of the immediate improvement in price which took place as a result of the introduction of the services. In the case of wattle bark the inspection service has now been in existence for three years, and within eighteen months of its inception the improvement in quality led to sales of Kenya wattle bark very close to parity with Natal wattle bark, whereas formerly the difference in price amounted to Sh. 30 per ton; subsequent improvement has practically eliminated all difference. In the case of maize, whereas this produce formerly was unexportable to European countries, now all maize which has passed inspection is exportable on the same basis as European maize, and receives the same price, quality for quality, enjoying the premium over Plate maize which the Kenya Flat White type obtained on the European markets. The improvement in the price to the native of beans, following the inspection service, was immediate, and amounted to Sh. 2/50 per bag for beans of uniform type over beans of mixed types, and considerably more than this over the former price of the inferior parcels generally offered for sale. A high quality has been attained in the exports of groundnuts and sesame from Nyanza, and the competition for these products has brought to the natives the full value of the improvement achieved.

Investigation of Overseas Markets

Inquiries were made overseas for markets for potatoes and beans.

Kenya potatoes have become a factor on the Bombay, Mauritius and Madagascar markets, but demand varies considerably; at times, certain varieties of potatoes sell readily, at others the buyers are said to dislike the Kenya pink-skinned variety (Kerr's Pink). All these points have been the subject of investigation.

In making inquiries for markets in which to place Kenya beans, it was found that different countries have different tastes for beans. South Africa likes beans of the French bean

type, whilst Malta, which imports large quantities of beans, will only take the broad bean type. In the main, native-grown beans in Kenya are of the French type, being originally used on the advice of produce merchants. As a result of investigations, broad beans will be given a trial, and if successful will be encouraged as well as the French type. The fact that the Kenya Farmers' Association handles the maize for export does away with marketing problems for that product.

The highlands of Kenya provide a good source of regular supply of seed potatoes for countries with warm climates, where seed potatoes will not keep over, and attention is being given to this market possibility, with despatch of samples to Malaya, Mauritius, British Somaliland; inquiries are on foot for South Africa.

Investigations in the gum arabic market were made, and for many other small crops.

Value of Native Exports from Kenya

A table is given below of the value of the native exports from Kenya in the years 1931-1936. It is desired to say, however, that the value of exports is not to be taken as a true index of native production surplus to needs. In the first place, values fluctuate from year to year; in the second, a great deal of the surplus native production is sold in the Colony itself. A true index of native effort is volume of production, and it is hoped to be able shortly to produce figures of sales by natives surplus to their own requirements which will reflect more truly the contribution of the native population to the wealth of the Colony.

	1931	*1932*	*1933*	*1934*	*1935*	*1936*
	£	£	£	£	£	£
Cotton ..	7,468	8,589	25,581	28,477	76,326	149,788
Maize ..	..	..	..	..	..	21,125
Potatoes ..	13,632	15,384	10,690	9,170	19,500	20,500
Wattle Bark	72,521	78,810	46,600	51,658	44,570	48,748
Wattle Extract ..	4,008	4,754	13,366	19,401	39,328	42,664
Hides ..	58,627	85,000	130,090	166,500	141,530	121,483
Skins ..	37,269	16,166	20,494	26,090	35,847	67,238
	193,525	208,703	246,821	301,296	357,101	471,546

Services for Unstaffed Districts

In 1931, a reorganization of the native agricultural services took place, and this was followed a year or so later by decentralization, effected through placing officers in charge of agricultural work in the three main agricultural Provinces, Nyanza, Central and Coast Provinces. It has now been possible to post either Agricultural Officers or Assistant Agricultural Officers to most districts within these Provinces; there are, however, still a few districts both in these and other Provinces which have no resident European or Asiatic supervisory staff, and to these occasional visits are paid by Agricultural Officers from other areas in order to advise and assist the District Commissioners concerned in developing the agriculture along sound lines. The following districts have received visits from the officers mentioned:—

Lumbwa: The Provincial Agricultural Officer, Kisumu, and the Marketing Officer.

Nandi: The Provincial Agricultural Officer, Kisumu.

Tambach and Kapenguria: The Agricultural Officer, Kitale.

Baringo: The Agricultural Officer, Njoro.

Masai: The Marketing Officer and the Grassland Officer.

Teita: The Provincial Agricultural Officer, Kilifi, and the Marketing Officer.

The agricultural potentialities in the Lumbwa, Nandi and Teita districts are considerable, and access to markets is easy, for, in addition to good main roads, the railway runs along the borders of the areas. Although development has proceeded slowly under the present system, it is felt that these districts are in urgent need of agricultural officers in order that the best and most rapid economic use may be made of these areas.

With regard to the Taveta area of the Teita district, I should like to thank the Department of Agriculture, Tanganyika Territory, for the assistance they have given in helping to develop this area, which is rather isolated from the remainder of the Coast Province.

GRADING AND INSPECTION SERVICES

The following report on the Grading and Inspection Services has been prepared by Mr. C. L. Silvester, the Chief Grader and Inspector:—

Plant Import Inspection

The following table gives the number of packages and values of the various importations into the Colony of seed, plants, fruit, etc., for 1934, 1935 and 1936:—

	No. of Packages			Declared Value		
	1934	1935	1936	1934	1935	1936
				Sh. cts.	*Sh. cts.*	*Sh. cts.*
Seeds ..	1,010	2,111	796	57,231 36	41,710 71	34,762 47
Fruit ..	23,906	20,597	26,304	203,464 11	197,385 14	260,490 39
Plants ..	223	678	236	9,720 53	7,957 44	6,576 84
Fruit Trees..	182	222	137	22,620 86	21,746 49	6,978 36
Tea Seed ..	43	554	309	2,553 00	91,684 00	12,173 88
Bulbs ..	280	192	200	7,435 10	5,096 94	32,665 00
	25,644	24,354	27,982	303,024 96	365,580 72	353,646 94

The number of packages imported shows an increase of 3,628 over the previous year's total, a percentage increase of 14.88 per cent.

The total value shows a slight reduction.

In addition, 148 packages, valued at Sh. 26,508/25 and 15 packages, valued at Sh. 374/25, were passed on behalf of Uganda and Tanganyika Territory respectively.

Grading and Conditioning Services

Maize Grading

Maize from the 1935-36 crop commenced to arrive at the Coast in November, 1935, and, at the commencement of the year, grading was at its peak. Grading was continuous throughout the year, with the exception of July, when no maize was graded.

During August a certain amount of old season maize was received, and from that time to December grading was confined to native-grown maize.

Maize from the 1936-37 season's crop commenced to arrive the third week in December.

(a) Maize submitted direct for Grading at the Coast and Kitale

A total of 837,098 bags of maize was submitted for grading. The following table gives the grades, number of bags and relative percentages of the total received, with comparative percentages for the previous year:—

Grade	Number of Bags	Percentage of Total Received	Comparative Percentage for 1935
		Per cent	*Per cent*
K2	395,071	47·19	76·03
K2 SW	100,975	12·06	7·34
K3	114,955	13·73	10·24
K3 SW	47,940	5·72	2·05
K7	548	0·06	·03
K8 FW	12,409	1·48	·53
K8 FW SW	8,158	0·97	·28
Total Graded ..	680,056	81·24	96·51
Rejected:			
Wet	61,922	7·39	1·96
Musty	11,264	1·34	·02
Weevily	64,859	7·75	1·33
Other Causes	18,997	2·27	·17
Total Rejected ..	157,042	18·76	3·49
Total Received ..	837,098	100·00	100·00

The total received, viz. 837,098 bags, is an increase of 257.651 bags submitted for grading at the Coast and Kitale during the previous year, being an increase of 44.46 per cent.

Examination of the percentage columns in the table reveals a serious falling off in the standard and quality of the maize graded.

In my annual report for 1935, in commenting on the high quality of the maize for the 1934-35 season's crop, the following note was made: "Evidence is by no means lacking, however, that the incidence of ear rots in the 1935-36 season's crop is on the increase, and weevils show corresponding increase."

Contributory causes to the high percentage of maize rejected as weevilly were the unseasonable climatic conditions experienced in certain areas of the Colony through February

(much maize was unable to "dry out", leading to increased weevil infestation), and the high percentage of native-grown maize rejected for this cause in August to December.

It should be stated here that included in the foregoing table are 58,700 bags of native-grown maize and 286,754 bags graded at Kitale. Particulars of this maize appear in later tables.

It is of interest to note that, from 1st January to 30th June, 704,870 bags of maize were submitted direct for grading at the Coast and Kitale; the relative percentages of K2 were 44.8 per cent and 62.63 per cent respectively.

The following table shows the sending station and the average moisture content of maize rejected as wet at the Coast and Kitale:—

Sending Station	Number of Bags	Average Moisture Content
		Per cent
Broderick Falls	308	14·4
Butere	223	14·2
Eldoret	373	14·6
Fort Hall	224	14·2
Hoey's Bridge	3,984	14·6
Kitale	12,453	14·3
Kampi-ya-Moto	2,983	15·4
Kibos	112	16·0
Karatina	110	14·4
Lugari	890	15·0
Lumbwa	224	14·6
Luanda	779	14·6
Menengai	7,624	16·0
Mile 11½ Solai	192	15·2
Mile 21¾	1,831	14·6
Maji Mazuri	1,344	14·4
Mitubiri	173	14·4
Mile 58/10	224	15·5
Nakuru	6,574	14·9
Njoro	267	14·7
Nairobi	163	14·3
Nyeri	112	15·5
Olpunyata	227	16·0
Rongai	10,499	14·8
Sabatia	1,321	14·8
Sagana	1,249	14·3
Wet by rain	7,439	..

Wet maize consigned direct to the Conditioning Plant is not included in the above.

(b) Maize Graded at the Conditioning Plant after Treatment

Grade	Number of Bags	Percentage Total	Comparative Percentage 1935
		Per cent	*Per cent*
K2	54,699	34·23	65·53
K3 ..	61,043	38·20	34·38
K3 C ..	11,121	6·95	..
K7 ..	5,837	3·65	..
K8 FW ..	11,003	6·87	·09
K8 FW C ..	13,744	8·6	..
Total Graded	157,447	98·54	100·00
Rejected : Musty ..	1,208	·75	..
Other causes	1,117	0·7	..
Total Received ..	159,772	100·00	..

The letter "C" following the grade indicates "treated by heat for the destruction of weevils".

The total graded after treatment at the Conditioning Plant, viz. 159,772 bags, is an increase of 756 per cent over the previous year's total of 18,654 bags.

(c) Maize Re-graded

Only 2,037 bags of maize were re-graded, and does not call for special comment.

(d) The total number of bags graded, the totals of tables *(a)* and *(b)* and the re-grades noted in *(c)*, viz. 998,907, is an increase of 66.13 per cent over the total of 601,260 bags graded in 1935.

Grading at Kitale

Grading at Kitale was continuous from 1st January to 14th June, and re-commenced on 12th December.

The following table gives particulars of the maize submitted for grading:—

Grade	Number of Bags	Percentage of Total Received
		Per cent
K2	179,711	62·67
K2 SW	32,153	11·21
K3	39,232	13·68
K3 SW	13,515	4·68
K7	21	—
K8 FW	1,038	0·36
K8 FW SW	881	0·30
Total Graded	266,551	92·95
Rejected—		
Wet	9,695	3·38
Musty	155	0·05
Weevily	9,137	3·19
Other Causes	1,216	0·42
Total Rejected	20,203	7·05
Total Received ..	286,754	100·00

The inland grading service at Kitale, which was reintroduced after a break of five years, proved very satisfactory. The advantages derived from this service can be briefly summarized as follows:—

(a) Growers, whose maize had been de-graded below K2 early in the season, made special efforts to improve the preparation of their maize for export.

(*b*) Growers whose maize was rejected as wet deferred delivery until the maize was dry.

(*c*) The Kenya Farmers' Association (Co-operative) Ltd. was able to control the railing of the different grades according to their immediate shipping requirements.

(*d*) The handling of this produce in the Port of Mombasa was greatly facilitated.

Native-grown Maize Submitted for Grading

The following table gives particulars of native-grown maize submitted direct for grading at the Coast:—

Grade	Number of Bags	Percentage of Total Received
		Per cent
K2	2,443	4·18
K2 SW	1,696	2·88
K3	9,938	16·93
K3 SW	8,301	14·14
K7	378	·64
K8	1,420	2·42
K8 SW	389	·66
Total Graded ..	24,565	41·84
Rejected:		
Wet	3,777	6·43
Musty	380	·64
Weevily	14,060	23·95
Other Causes ..	15,918	27·01
Total Rejected ..	34,135	58·15
Total Received ..	58,700	100·00

In addition, 13,538 bags of native-grown maize were consigned direct to the Maize Conditioning Plant.

As a result of the Produce Inspection Services inaugurated at certain centres in native reserves, and the issues of improved seed maize, the outcome of the establishment of seed farms, native-grown maize has so improved in quality that it is now possible to export it to overseas markets on the same standards as European-grown maize.

When it is remembered that no native-grown maize has been exported, other than to local ports, since 1929, and that at that time this maize was normally of the standard K7 (mixed) and K8 (under-grade), it will be appreciated that considerable progress has been made. 38.13 per cent of the maize submitted direct for grading was placed in grades K2 and K3 and K2 SW and K3 SW.

There was an entire absence of extraneous matter.

As this native-grown maize has been fully commented upon in departmental reports, it is not proposed to write at length on this subject, but one item in the table, viz. rejections under the heading "Other Causes", warrants serious comment. 15,918 bags, or 27.01 per cent of the total received,

were rejected under this heading. The reasons for rejection were, in most cases, threefold:—

(*a*) *Underweight.*—Gross weight of bags varied from 196 to 202 lb. Regulations prescribe 200 lb. net per bag, equivalent to 202½ lb. gross.

(*b*) *Undergrade Bags.*—Practically all new bags used were 2 lb. and 2¼ lb. bags. Regulations prescribe 2½lb. bags of a specific standard.

(*c*) *Unsound and Unmerchantable Second-hand Bags.*

The greater proportion of the maize rejected for other causes would have been graded K3 SW and a small quantity K2 SW.

The percentage admitted to Grades K2 and K3 would have been considerably higher had traders taken due care in handling maize intended for export overseas.

Over 33,000 bags of rejected native maize were treated at the Maize Conditioning Plant. Any re-bagging required was done at the Conditioning Plant after the maize had been treated; all this maize was eventually exported.

Shipments

Two hundred and twenty-five export certificates in respect of 807,015 bags of maize were issued, as shown in the table following:—

Number of Certificates	Number of Bags	Description
35	61,318	K2 Second Grade.
25	386,214	K2 Second Grade (shipped in bulk).
15	42,570	K2 SW Second Grade. Slightly weevily.
8	42,116	K2 SW Second Grade. Slightly weevily. (Shipped in bulk.)
35	48,176	K3 Third Grade.
19	130,473	K3 Third Grade (shipped in bulk).
12	16,239	K3 SW Third Grade. Slightly weevily.
5	19,291	K3 SW Third Grade. Slightly weevily. (Shipped in bulk.)
19	13,620	K3 C Third Grade. Treated by heat for the destruction of weevils.
8	3,109	K7 Mixed.
20	22,674	K8 W. Under-grade.
8	4,623	K8 W SW Under-grade. Slightly weevily.
1	1,185	K8 W SW Under-grade. Slightly weevily. (Shipped in bulk.)
14	13,172	K8 W C Undergrade. Treated by heat for the destruction of weevils.
1	2,235	K8 W Undergrade. (Shipped in bulk.)

Three inspection certificates for 1,431 bags were issued.

Local Shipments

55,793 bags of maize were shipped to ports north of Beira, south of Port Said, and the coast of Arabia.

The total is a decrease of 28.8 per cent compared with the total of 78,357 bags for the previous year.

Maize—General

The weather conditions which obtained in certain maize-growing areas during the growing period were very conducive to the development of ear rots, and the incidence of ear rots in certain months of the year was very high. In addition to pink ear rot, yellow discoloration of the tips of the berries was very noticeable, giving the grain a most unsatisfactory appearance.

Certain districts, notably Menengai, were unable to dry the crop after havesting owing to unseasonable weather, and much of this maize arrived at the Coast in a very musty condition.

The unseasonable rains after harvesting, with consequential high moisture content of the grain, led to an increase in the incidence of weevil infestation.

Early consignments of maize from the 1936-37 season's crop show fairly high incidence of ear rot, and much wet maize is in evidence.

Wheat Grading

After an interval of five years, the export of wheat from the Colony was re-commenced, due to a surplus of low-grade wheats over the milling requirements of the Colony.

Having regard to the number of varieties and the low bushel weight of many of the parcels, it was agreed that the wheat should be exported on an inspection certificate.

24,786 bags were received, and 24,780 bags were passed as fit for shcipment. The bushel weight of the consignment ranged from 63.5 lb. to 45.9 lb.

The following table gives variety and number of bags of each variety inspected:—

Variety	Number of Bags	Variety	Number of Bags
Kenya Governor ..	1,436	Burbank	814
B.230	9,016	K2 R5	678
Sabanero	4,474	Nandi	40
Equator	4,802	Golden Ball	20
B.256	3,198	K.261	12
Kenya Standard ..	296		

Conditioning Plant, Kilindini

Maize

162,500 bags of maize were treated, of which 57,368 bags were accepted consigned direct to the Plant.

Beans

12,994 bags of beans were treated for the destruction of bean beetle.

Grading of Potatoes

89,763 cwt. of potatoes were submitted for grading and classified as under:—

Grade	Number of Cwt.
K1	1,942
K2	84,579
Seed	2,357
Rejected ..	885

The total submitted for grading, viz. 89,763 cwt., is an increase of 7.7 per cent over the previous year's total of 83,343 cwt., and is the highest total recorded. The percentage of rejected to the total graded was 0.98 per cent, the lowest percentage recorded.

Rejections were for the following causes:—

Cwt.	
42	Mixed varieties submitted as Seed Potatoes.
51	Extreme decay.
451	Undersized.
90	Cut and damaged tubers.
251	Sprouting.

The inspection of this produce at certain points in the reserves led to a great improvement in quality. There appears to be an idea in some areas that only very large tubers should be exported. This is a wrong ideal; medium-sized potatoes are preferable, except where potatoes are utilized for the "chipping" trade.

Damage due to the potato moth was practically non-existent.

It is considered unfortunate that "inland inspection" has not stopped the practice of mixing different types and varieties in the same bag.

Ships' Stores

Export entries in respect of 5,259 bags of potatoes, estimated at 8,922 cwt., were passed, an increase of 541 cwt. over the previous year's total.

Grading of Beans

With the exception of Madagascar butter beans, all beans were graded at the Conditioning Plant after being treated for the destruction of bean beetle (*Bruchus* sp.).

The following table gives the quantities, varieties and grades of beans submitted for grading:—

Variety	K1	K2	K3	K4	Total Graded	Re-jected	Total Re-ceived
Rose Coco	..	6,571	..	3,556	10,127	1	10,128
Canadian Wonder ..	..	1,996	..	576	2,572	..	2,572
Can. Wonder (White)	44	..	..	..	44	..	44
Madagascar Butter Beans	..	1,226	..	..	1,226	..	1,226
Painted Lady ..	..	43	..	..	43	..	43
Mixed	..	..	110	..	110	..	110
	44	9,836	110	4,132	14,122	1	14,123

Beans harvested from the short-rains crop which were received at the Coast from January to May were of very good quality. The long-rains crop, received from July to December, was of very poor quality, and accounts for 4,132 bags being graded K4. Discoloration was very serious and anthracnose damage much in evidence.

Cool Stores

Comparative table of commodities stored during the last five years:—

Commodity	Unit	1936	1935	1934	1933	1932
Fruit	lb.	314,210	191,657	276,969	126,690	103,145
Fresh Fish ..	,,	30,007	9,195	20,914	86,021	100,441
Cured Fish ..	,,	50,416	48,427	40,839	41,407	36,560
Cheese . ..	,,	9,638	10,328	11,422	9,595	9,652
Offal	,,	3,581	4,577	3,991	2,749	2,760
Poultry ..	Doz.	114⅓	184⅚	59¼	64⅔	8⅔
Butter ..	Cases	15,582	8,278	3,783	1,803	5,213
Beef	lb.	71,877	45,285	49,519	35,250	35,040
Mutton & Pork	,,	36,678	39,997	31,273	18,692	9,900
Eggs	Doz.	11,310	7,925	3,225	6,720	4,318
Ham and Bacon	lb.	1,321	500	756	905	871
Vegetables ..	,,	736	2,787	2,949	4,523	634
Yeast	,,	544	212	645	1,924	1,611

Note.—A small number of miscellaneous articles is stored each year which does not warrant inclusion in the foregoing table.

Very satisfactory increases in the quantities stored were shown by the more important commodities, viz. butter, fruit and beef.

On a few occasions it was necessary, owing to lack of space, to refuse commodities offered for storage, notably butter, eggs, and imported fruit.

Both machinery units were overhauled and worked alternatively through the year.

On the financial side it proved a record year.

H. WOLFE,
Deputy Director (Plant Industry).

DIVISION OF ANIMAL INDUSTRY

This report, which is largely compiled from reports of District Veterinary Officers, will be considerably condensed, following the practice observed in recent years, and I am grateful to Capt. E. J. Mulligan, Senior Veterinary Officer, who has been mainly responsible for its compilation.

The report of the Chief Veterinary Research Officer and the report on the operation of the Naivasha Experimental Station are presented in a separate volume.

The great assistance rendered to the Division during the year by officers of the Administration, Police and other departments is freely acknowledged, and the valuable work rendered by the staff is again recorded with much appreciation.

The Deputy Director (Animal Industry) and Chief Veterinary Officer proceeded on leave in April and returned to the Colony in November. During his absence, Mr. R. Daubney acted as Deputy Director (Animal Industry) and Chief Veterinary Officer, additional to his duties as Chief Veterinary Research Officer.

The effective European staff at the end of the year consisted of: The Deputy Director (Animal Industry) and Chief Veterinary Officer; one Senior Veterinary Officer; ten Veterinary Officers; five Instructors in Stock; eleven Stock Inspectors, and two Assistant Stock Inspectors.

One Senior Veterinary Officer, one Instructor in Stock, and one Stock Inspector retired during the year, on retrenchment.

Mr. H. Hay-Barclay, M.R.C.V.S., proceeded on leave in August, pending transfer to Nigeria.

General

There is an increase in departmental revenue for the year of £3,178. The total revenue of £12,933 was collected for dipping, quarantine and inoculation fees, as compared with £9,755 in 1935.

A conference on co-ordination of veterinary research, presided over by the Deputy Director (Animal Industry) and Chief Veterinary Officer, was held at Kabete in January, and was attended by delegates from Tanganyika Territory, Uganda, Sudan, Belgian Congo, and this Colony. Amongst other matters discussed were diseases of the Virus, Bacterial, Protozoan, and Metazoan groups.

In March, the Stockowners' Conference, presided over by the Director of Agriculture, was held in Nairobi. The Conference was attended by some forty delegates, representing eighteen farmers' associations. The thirty-eight items on the agenda mainly concerned control of stock diseases, control of movement of stock, dairy industry, and some items of a general nature.

In June a show was held in Nakuru by the Royal Agricultural and Horticultural Society of Kenya; the cattle exhibits were outstanding in numbers and quality.

During the year 114 pure-bred cattle of various breeds were imported into the Colony—the highest number for several years.

The sheep imported, principally Merino, numbered 166.

The number of cattle exported to Italian Territory for slaughter exceeded 9,000 and the number exported to Zanzibar was 1,398.

The amount of butter exported during the year was 24,984 cwt., as compared with 16,287 cwt. for 1935.

The export of wool showed some slight increase over the preceding year; 13,072 cwt. for 1936, as against 12,626 cwt. for 1935.

There was a considerable decrease in the volume of hides exported in 1936, but a considerable increase in skins. Hides decreased from 80,684 cwt. in 1935 to 32,462 cwt. in 1936, whereas skins increased from 1,197,482 pieces in 1935 to 1,796,796 pieces in 1936.

The total value of hides and skins exported was £191,421 as compared with £179,387 for 1935.

The decrease in the volume of hides exported is mainly due to decreased mortality from drought conditions in the native reserves.

The increased value of hides and skins exported is mainly due to the increased volume of skins exported, better prices prevailing during 1936, and to extension of the shade-drying method of preparation in respect of both hides and skins.

At the end of the year there were some 360 shade-drying sheds operating throughout the native reserves.

Progress in the native dairy industry has been satisfactory. At the end of the year there were 772 dairies operating in the native reserves, and the production of ghee (clarified butter) approximated 10,000 cwt.

The estimated total number of cattle slaughtered for meat at recognized slaughtering places throughout the Colony was 130,537, of which probably 75,000 were slaughtered in the Kavirondo districts.

The estimated numbered slaughtered in the settled areas was 30,537, of which 13,866 were slaughtered in the Nairobi Abattoir.

The percentage of carcasses condemned at the Nairobi Abattoir for measles during the year was: Grade, 9.4 per cent; Native, 22.5 per cent.

Rinderpest, East Coast fever, blackquarter, and foot-and-mouth disease were particularly prevalent during the year. The recorded outbreaks numbered:—

Rinderpest	44
East Coast Fever	146
Blackquarter	255
Foot-and-mouth Disease	58

The total number of rinderpest immunizations carried out by the staff in the settled areas and native reserves was 102,698.

The change-over to mixed farming has made some headway, but difficulty has been experienced in obtaining native heifers immune to East Coast fever for foundation breeding herds. Prices for native cattle considerably increased during the year.

The Meat and Live Stock Inquiry Committee appointed towards the end of 1935 to investigate, *inter alia*, the possibility of organizing a meat export trade, continued its deliberations, arising from which Government entered into negotiations with Messrs. Liebig's Extract of Meat Company; negotiations which terminated in a decision by that Company to erect and operate a factory in this Colony during 1937.

It is anticipated that the factory will absorb from 30,000 to 45,000 head of cattle per annum.

Through the medium of the Meat and Live Stock Inquiry Committee, discussions were held with a representative of the Imperial Cold Storage Company of Southern Rhodesia without, so far, reaching any form of finality.

Further references to these subjects are made under the appropriate headings.

IMPORTATION OF PURE BRED STOCK INTO KENYA COLONY DURING 1936

Type	*Ex* U.K.		*Ex* S.A.		*Ex* U.S.A.		*Ex* Holland		Total Bulls	Total Cows and Heifers	Final Total
	Bulls	Heifers	Bulls	Heifers	Bulls	Heifers	Bulls	Heifers			
Red Poll ..	14	5	9	7	3	..	..	..	26	12	38
Guernsey ..	3	5	4	2	..	..	..	..	7	7	14
Ayrshire ..	8	..	4	..	..	..	..	..	12	..	12
Jersey	2	1	2	2	..	..	..	..	4	3	7
Friesian.. ..	2	..	2	..	..	..	12	..	16	..	16
Shorthorn ..	9	..	..	..	..	..	..	..	9	..	9
Aberdeen Angus	5	..	..	..	..	..	..	..	5	..	5
Hereford ..	3	..	..	..	..	..	..	..	3	..	3
Dexter	1	..	..	..	..	..	..	..	1	..	1
Others	..	..	6	3	..	..	..	..	6	3	9
									89	25	114

Total Cattle Imported, 1935 : 58.

IMPORTED SHEEP, 1936

Type	*Ex* U.K.		*Ex* S.A.		Total	Total	Final Total
	Rams	Ewes	Rams	Ewes	Rams	Ewes	
Merino	..	..	93	31	93	31	124
Romney Marsh..	10	6	..	..	10	6	16
Ryeland ..	9	..	..	..	9	..	9
Southdown ..	2	6	..	..	2	6	8
Suffolk	2	5	..	..	2	5	7
Dorset	1	..	..	..	1	..	1
Cheviot	1	..	..	..	1	..	1
					118	48	166

Total Sheep Imported, 1935 : 65.

OTHER ANIMALS IMPORTED

Horses	5
Pigs	8
Dogs	34
Poultry	169
Cats	4
Cage and other Birds	61

Stock Movements

A—Exports

Kenya to Uganda

Exports of cattle to Uganda ceased entirely in February, 1935, and no cattle were exported during 1936.

Year	Cattle	Sheep and Goats	Pigs
1935 ..	67	2,788	60
1936 ..	—	5,070	79

Lamu to Zanzibar

	1935.	1936.
Cattle	875 ...	1,393
Sheep and Goats	3,936 ...	7,058

Kenya to Italian Territory

	1936.
From the Nanyuki, Laikipia, Nakuru, Naivasha areas, by rail and ship: Cattle	5,463
Overland to Italian territory on permit, from Samburu: Cattle	442
From the Masai District: Cattle ...	504
Total number of cattle to Italian Territory on permit	9,052

B—Internal Markets

Masai District

Cattle—

To Nairobi Abattoir	3,859
To Kikuyu	3,264
To Italian Territory	504
To Mombasa	2,379
To South Kavirondo (approx.) ...	6,000
Total ...	15,006

Machakos Reserve

Stock were passed out of the Machakos Reserve as follows:—

Cattle	10,520
Sheep and Goats	49,243

Kitui Reserve

Stock movements from the Kitui Reserve during 1936 were:—

Cattle	6,077
Sheep and Goats	15,278

Baringo Reserve

Movements from the Reserve were:—

Cattle	194
Sheep and Goats	18,433
Donkeys	626

Samburu Reserve

Stock movements from the Samburu Reserve were:—

Cattle—

To Meru and Isiolo	711
To Italian Territory on the hoof ...	422
To Italian Territory and local markets by rail and ship	1,351
To Mombasa via Kibwezi	100
Total cattle ...	2,604
Sheep and Goats to Isiolo	4,523
Donkeys to Isiolo	419

Nandi Reserve

Stock movements from the reserve were:—

Squatter Cattle	7,179
Trade Cattle	23
European Cattle	796
Sheep and Goats	3,183

Central Kavirondo Reserve

The following are comparative figures for stock passed through Kibigori during the years 1934, 1935 and 1936:—

	1934	1935.	1936.
Bullocks	1,269	351	658
Heifers	5,477	926	283
Sheep and Goats ...	8,532	1,301	652

South Kavirondo Reserve

Slaughter cattle as follows were passed to Central Kavirondo:—

Cattle	8,217
Sheep and Goats	200

It is, however, considered that the total number of cattle so moved approximates 17,000 head.

North Kavirondo Reserve

3,840 head of cattle passed out of the reserve during the year.

Lumbwa District

The following stock passed out of the district during the year:—

Slaughter Cattle	9,929
Sheep and Goats	8,337
Pigs	343

Mariakani Centre

The following stock from the various districts passed through this centre during the year:—

	Cattle.	*Sheep and Goats.*
From Tana River	1,300	—
From Lamu	50	—
From Kitui District	1,491	154
From Voi District	67	115
From Masai District	569	—
From Samburu District	100	—
From Other Districts ...	—	4,078
Total passed through Centre	3,577	4,347

Mkowe Quarantine Station

Live stock passed through the Mkowe Quarantine Station:—

	Cattle.	*Sheep and Goats.*
From—		
Northern Frontier District	1,424	9,745
Tana River District ...	441	150
Lamu District	53	—
Total ...	1,918	9,895

Mombasa District

Stock passed through Macupa:—

Cattle	3,751
Sheep and Goats	10,208

Stock moved to Mombasa by rail:—

Cattle	812
Sheep and Goats	4,877

STOCK SLAUGHTERED DURING THE YEAR 1936 AT RECOGNIZED PUBLIC SLAUGHTERING PLACES—SETTLED ARES

Settled Areas	Cattle	Sheep and Goats	Pigs
Nairobi	13,866	38,288	2,334
Mombasa	6,561	19,381	..
Nakuru	1,302	2,465	190
Eldoret	1,146	1,431	339
Kitale	1,111	810	78
Naivasha	220	265	35
Gilgil	180	152	..
Elburgon	243	660	..
Kakamega	3,000	729	86
Kisumu	1,500	..	..
Nanyuki	214	240	..
Nyeri	597	797	..
Machakos	597	261	..
Total Settled Areas	30,537	65,479	3,062

Nairobi Abattoir

The total number of animals slaughtered was 54,984, an increase of 8.5 per cent, as compared with the previous year. Comparative figures are as follows:—

		1936	1935
Cattle :	Grade ..	4,422	4,806
	Native ..	9,444	9,007
Sheep and Goats :	Grade ..	26,199	23,417
Pigs		2,334	2,226
Calves		496	537

The number of cattle condemned for all causes was 3,024, an increase of 2 per cent over last year.

The percentage of grade oxen condemned for *Cysticercus bovis* (Measles) was 9.4 per cent, whereas the percentage of native cattle condemned was 22.5 per cent.

The percentage of pigs condemned was 2.4 per cent. Two cases of *Cysticercus cellulosæ* were observed.

SECTION I—SETTLED AREAS

Staff Distribution

During the year the European staff was distributed as follows:—

District	Veterinary Officer	Stock Inspector
Nairobi	1	—
Nakuru	1*	—
Naivasha	—	1
Eldoret	1	—
Lumbwa	1	—
Nanyuki	1	—
Thomson's Falls	—	1
Total ..	5	2

*Part Time.

Disease

The following is a summary of outbreaks of the more important diseases in Settled Areas during the past five years:—

Disease	1932	1933	1934	1935	1936
Rinderpest	61	35	68	37	44
East Coast Fever	76	109	83	85	146
Pleuro-pneumonia	1	3	4	4	—
Blackquarter	54	56	58	56	255
Trypanosomiasis	8	12	3	2	5
Foot and Mouth Disease ..	21	20	26	7	58
Horse Sickness	11	12	14	27	52
Ulcerative Lymphangitis ..	9	5	15	6	6
Epizootic Lymphangitis ..	6	—	—	1	1
Contagious Bovine Abortion ..	16	13	19	8	17
Swine Fever	1	—	4	2	4
Anthrax	25	41	29	34	22
Rabies	23	22	11	12	44

Quarantines

The following particulars are furnished in respect of quarantines imposed and revoked during the year in Settled Areas and Natives, showing comparative figures for 1935:—

Disease	Imposed		Revoked		Remaining	
	1935	1936	1935	1936	1935	1934
East Coast Fever:						
Northern "Clean" Area	48	51	49	41	111	121
Molo "Clean" Area ..	5	3	8	9	15	9
Limuru "Clean" Area	4	5	—	4	7	8
Rinderpest	56	49	58	48	27	28
Trypanosomiasis	2	2	2	1	13	14
Rabies	3	2	7	1	5	6
Bovine Pleuro-pneumonia	4	1	2	3	16	14

Incidence of Diseases

Rinderpest

In the Settled Areas during the year there was some slight increase in the number of outbreaks of rinderpest reported—44 as compared with the number 37 reported during the previous year. More than half the total number occurred in the Nairobi district, principally amongs native-owned cattle.

The more important stock-breeding districts of the Colony were singularly free from the disease; no natural outbreaks were reported from the areas of Naivasha and Gilgil, only six from Nanyuki, and two from the Thomson's Falls area. This satisfactory position may largely be attributed to the elimination of squatter-owned cattle.

As in previous year, the outbreaks of rinderpest could almost invariably be traced to illicit movement of native-owned cattle. Such movements, although gradually decreasing as more and more squatter-owned cattle are being returned to the native reserves, are nevertheless of sufficient frequence as to cause an ever-present danger of disease dissemination.

It is unfortunately a practice amongst many farmers to defer rinderpest immunization until there is a history of rinderpest in the district. Such a practice is deplorable and economically unsound, especially when large numbers of valuable, highly susceptible cattle are concerned. The dissemination of rinderpest by game is also an important factor to be considered; few farms are boundary fenced, and few fences are game-proof.

For the protection of cattle against rinderpest there are four forms of treatment available, viz:—

1. Inactivated vaccine.
2. Vaccine and virus.
3. Simultaneous serum-virus method.
4. Serum alone.

Stock farmers usually indicate, frequently through their associations, the mode of immunization required for any district or group of farms. Some districts elect for the employment of inactivated vaccine, and oppose the introduction of virus in any form. Other districts desire vaccine-virus treatment, while still others require the simultaneous method and the A.M. brand.

Generally speaking, inactivated vaccine, which incidentally may be administered at any time by the farmer himself—the usual practice—is favoured in areas carrying large herds of high-grade and pure-bred stock. A high degree of resistance to rinderpest is set up following this method, and maintained for perhaps two years. Annual vaccination with a smaller dose of vaccine causes considerable reinforcement of the resistance.

Certain farmers, however, require a more extended state of resistance or permanent immunity, without the risk of the introduction of blood-borne diseases such as piroplamosis and anaplasmosis, and where young animals only are to be treated the vaccine and virus method appears to satisfactorily serve this purpose.

The mode of procedure is as follows: 15 c.c. of vaccine are administered subcutaneausly, followed by 15 c.c. of spleen virus fourteen days later.

The doses are constant for all animals varying in weights and ages. These vaccinations are invariably carried out by members of the Veterinary Service. Thermal reactions are sometimes severe, but nevertheless mortality is usually very low and, as has been stated, the risk of blood-borne disease transmissions from the virus donor is eliminated. It is considered that the resultant immunity is permanent.

The simultaneous virus-serum method of immunization is now usually reserved for native cattle immune to tick-borne diseases, and for which a definitely permanent immunity to rinderpest is required. Spleen virus, prepared at the Veterinary Research Laboratory, is now generally used instead of the blood virus formerly prepared in the field.

The serum alone method is rarely advocated because of the transient nature of the resistance conferred and the expense involved.

RINDERPEST IMMUNIZATIONS—SETTLED AREAS

	Double Inoculations	Serum Alone	V.B. Tests	Vaccine Alone	Vaccine and Virus
Nairobi	6,181	..	3	..	..
Eldoret	35,095	352	..	..	799
Macahakos	644	..	..	413	237
Nanyuki ..					
Thomson's Falls	..	..	..	..	6,208
Laikipia ..					
Lumbwa	8,675	..	6	..	1,133
Naivasha	..	..	..	..	2,259
Kibigori	3,067	..	..	..	..
Total ..	53,662	352	9	413	10,616

Total Double Inoculations .. 53,662
Total Immunizations .. 65,052

Rinderpest immunizations in native reserves are shown in the appropriate place in Section II—Native Reserves. The aggregate immunizations for the whole Colony are, however, shown here for easy reference.

Double Inoculations	97,196
Vaccine and Virus	10,816
Vaccinations	4,228
Virulent Blood Tests	106
Serum Alone	352
Total Immunizations ...	102,698

Note.—The figures for rinderpest vaccinations show only the numbers of animals vaccinated by the staff, and do not include vaccinations carried out by stockowners themselves.

East Coast Fever

Many more outbreaks (146) of East Coast Fever have been reported during the year than the number (85) reported the previous year. This increase of 61 outbreaks does not necessarily represent an increased invasion of the "Clean Areas" of the Colony; it is actually more than accounted for by outbreaks in certain enzootic areas, where attempts are now being made at elimination or suppression.

The tendency towards mixed farming on many holdings formerly devoted, or almost entirely devoted, to pure agriculture is noticeable. More interest is consequently taken in disease; indeed, on many such farms, cattle dips have been erected, paddock fencing commenced, and squatter cattle reduced in numbers or entirely removed.

The Fencing and Cattle Cleansing Ordinances have not yet been applied, and without them it is difficult to see how material progress in the elimination of East Coast fever can be attained. It is the case that many farmers have fenced their farms, and many more have provided dipping tanks, but until those who are unable or unwilling to do so are brought into line, East Coast fever must remain a source of considerable loss to the stockowning community.

The implementation of the Fencing Ordinance would necessarily involve a huge financial outlay, impossible or exceedingly burdensome at this stage, so soon after times of real hardship and depression, but the application of the Cattle Cleansing Ordinance alone would undoubtedly go a long way towards suppression of the disease, and give stockowners a greater sense of security.

Farmers in the Thomson's Falls district—an important stock-breeding area—have through their associations submitted a request to the have the Cattle Cleansing Ordinance applied to that area. If this request, which is now under the consideration of Government, is implemented, the operation of the Ordinance will be watched with keen interest by neighbouring and, indeed, all cattle-breeding districts in the Colony.

As in the case of rinderpest, illicit movements of native cattle continue to be the main sources of East Coast fever infection, and these sources must remain as long as squatter-owned cattle are permitted to remain on European-owned farms. This position is well recognized by the majority of stockowners, and, in fact, many associations have passed resolutions agreeing to the total abolition of squatter cattle in their districts. In practice, however, it has been found that resolutions of agreement are not always sufficient to maintain a district free from squatter cattle; statutory powers are essential for this purpose. Such powers are anxiously awaited under the new Squatters Ordinance.

As long as squatter cattle are permitted to remain on occupied farms, it is difficult to see how they can be entirely prevented from grazing on unoccupied farms. This is one of the major problems of East Coast fever control.

The approximate number of registered dipping tanks in the Colony is 600.

Contagious Bovine Pleuro-pneumonia.

No outbreak of this disease has been reported in the Settled Areas during the year. This position is particularly satisfactory, since the disease is widely prevalent in certain native reserves. Stockowners bordering on these reserves are continually exhorted to vaccinate their cattle annually; a practice which is rarely observed, although vaccine is issued free of charge.

Rabies

Only four cases of rabies were confirmed in the Settled Areas during the year, as compared with twelve cases in the previous year.

All four cases occurred in the Uasin Gishu district, and three of them actually on the same farm. The fourth case was reported from a farm on which two cases had appeared the previous year. In each instance the animal concerned was a jackal.

Intense poison-baiting was carried out during the year, with the following known mortality:—

Jackals	473
Hyenas	90
Wild Cats	27
Mongoose	9
Dogs	47

Some 6,278 poison baits were laid.

Reference is again made to rabies under Section II—Native Reserves, of this report. Only two cases of the disease were confirmed from the native reserves. The total number of cases confirmed in the Colony during the year was therefore six, as compared with seventeen cases the previous year.

Blackquarter

The total number of outbreaks recorded in the Settled Areas during the year was 255, as compared with 56 the previous year. The high incidence of the disease was no doubt indirectly due to the increased rainfall.

The disease was particularly prevalent in the Uasin Gishu and Trans Nzoia districts and the Lumbwa, Nanyuki and Nakuru districts. In certain outbreaks mortality was exceedingly severe. Many herds were protected by vaccination; in

fact, applications for vaccine received at the Veterinary Research Laboratory were so numerous that they severely taxed resources for preparation and supply.

Some 14,000 head of cattle were vaccinated in the Uasin Gishu-Trans Nzoia district.

Anthrax

This disease was not very prevalent during the year; 22 outbreaks were recorded, as against 34 in the previous year. Vaccination is usually effective in controlling mortality. On farms which are known to be highly infected, vaccination is carried out as an annual practice.

It is not unusual for natives to become infected by consuming meat from an unsuspected anthrax carcass.

Many isolated cases of anthrax undoubtedly occur which are never suspected or reported.

Foot-and-mouth Disease

Towards the end of the year foot-and-mouth disease became prevalent, and 58 outbreaks were recorded as against seven outbreaks in the previous year. Outbreaks were more numerous in the Nakuru district than in any other area.

Generally speaking, the disease was of a mild nature, but in some instances considerable mortality was experienced in young calves. In dairy herds there was usually a material decrease in the milk yield, and in many instances mastitis supervened.

Native oxen infected do not always show well-defined lesions, and thus symptoms may escape observation; the animals may remain at work and remain infective agents for a long time before the source is traced. The quarantine measures which were adopted in all infected areas, although not entirely successful, considerably assisted in preventing extension.

Ulcerative and Epizootic Lymphangitis

The number of cases reported during the year was exactly the same as for the previous year, i.e. six cases of ulcerative lymphangitis. Greater care and attention to grooming, management, treatment of wounds and abrasions are undoubtedly the factors which are largely responsible for maintaining this low incidence.

Trypanosomiasis

Five outbreaks were recorded, as against two outbreaks the previous year. One of these outbreaks was really a recrudescence of the disease on a farm quarantined the previous year.

The disease is not prevalent in the Settled Areas, though from time to time tsetse-fly invasions do occur in certain districts, with resultant outbreaks of disease.

Treatment with "Surfen C" gave promising results.

Contagious Bovine Abortion

Seventeen outbreaks were reported during the year, as compared with eight outbreaks the previous year.

These figures cannot, however, be regarded as truly indicating the incidence of the disease in the Colony. Contagious abortion is undoubtedly widespread amongst grade and native herds, and many outbreaks never come under observation.

Swine Fever

Four outbreaks of the disease were reported during the year, as compared with two outbreaks in the previous year.

Hæmorrhagic Septicæmia

Eight outbreaks of the disease came under observation, with a wide distribution.

Vaccination as a preventive treatment was quite successful in all but one outbreak. Re-vaccination after six months was recommended in this case.

Horse Sickness

Horse sickness was exceedingly prevalent during the year; some fifty-two outbreaks were recorded, as against twenty-seven outbreaks the previous year.

Recovery was frequent in vaccinated animals, while mortality was very severe in unvaccinated animals.

The increased rainfall during the year was probably indirectly responsible for the increased number of outbreaks.

Other Diseases

In addition to the diseases noted above, the following diseases were also recorded. Diseases of the tick-borne group were generally extremely prevalent:—

Cattle.—Heartwater, piroplasmosis, anaplasmosis, colon bacillosis, bacillary necrosis, paratyphoid, hæmorrhagic septicæmia, malignant catarrh, tuberculosis, measles, filariasis, streptothricosis, cowpox, mastitis, malignant œdema, bovine mange, coccidiosis, vaginitis, hæmaturia, Nakuruitis, "Turning Sickness," "Ondiri Fever," "Three Day Sickness," vegetable poisoning, arsenical poisoning.

Sheep.—Sheep scab, Nairobi sheep disease, blue tongue, Rift Valley fever, Laikipia lung disease group, lamb dysentery, sheep pox, heartwater.

Goats.—Contagious caprine pleuro-pneumonia.

Pigs.—Measles, swine influenza.

Horses.—Biliary fever.

Dogs.—Canine piroplasmosis, trypanosomiasis.

Poultry.—Fowl typhoid, fowlpox, coccidiosis, Newcastle disease (one suspected outbreak), fowl leucæmia, bacillary white diarrhoea.

MACHAKOS

Disease	1933	1934	1935	1936
Rinderpest	5	6	2	3
Bovine Pleuro-pneumonia	—	—	—	—
Anthrax	—	—	1	2
Blackquarter	—	—	2	3
Ulcerative Lymphangitis	—	2	—	—
Trypanosomiasis	—	—	2	1
Foot and Mouth Disease	—	—	4	—
Haemorrhagic Septicaemia	—	1	—	3
Tuberculosis	—	—	—	1

LUMBWA

Disease	1933	1934	1935	1936
Anthrax	2	2	—	3
Anaplasmosis	—	2	—	8
Blackquarter	—	2	3	59
Contagious Abortion	1	2	4	2
East Coast Fever	4	7	5	4
Foot-and-Mouth Disease	—	4	—	2
Hæmorrhagic Septicæmia	1	1	—	2
Haematuria	—	—	—	3
Horse Sickness	1	2	—	2
Kikuyu Fowl Disease	—	—	—	—
Piroplasmosis	—	—	—	—
Pleuro-pneumonia	1	2	1	—
Rabies	13	2	—	—
Rinderpest	12	17	4	2
Trypanosomiasis	1	—	—	—

NANYUKI

Disease	1933	1934	1934	1935
East Coast Fever	30	14	29	33
Rinderpest	—	—	17	8
Bovine Pleuro-pneumonia ..	1	17	—	—
Trypanosomiasis	—	2	—	6
Foot-and-Mouth Disease ..	7	14	1	10
Anthrax	5	13	10	2
Blackquarter	5	5	—	69
Heartwater	4	4	3	1
Nairobi Sheep Disease ..	—	1	1	2
Horsesickness (reported) ..	9	2	17	35
Cowpox	—	—	—	3
Swine Fever	—	—	—	2
Haemorrhagic Septicaemia ..	—	—	—	1
Malignant Catarrh	—	—	—	1
Anaplasmosis	—	—	—	55

ELDORET

Disease	1933	1934	1935	1936
Rinderpest	7	5	1	5
East Coast Fever	26	11	22	42
Anthrax	9	4	1	2
Blackquarter	38	55	37	100
Trypanosomiasis	—	—	—	—
Epizootic Lymphangitis ..	—	—	—	1
Ulcerative Lymphangitis ..	1	—	2	3
Foot-and-Mouth Disease ..	2	4	—	—
Horse Sickness	—	1	—	1
Kikuyu Fowl Disease ..	3	1	1	—
Contagious Abortion	—	2	4	1
Bovine Pleuro-pneumonia ..	—	—	—	—
Cowpox	2	—	—	—
Rabies	7	9	12	4

NAKURU

Disease	1933	1934	1935	1936
Rinderpest	4	1	2	1
East Coast Fever	17	19	13	61
Trypanosomiasis	6	1	1	—
Blackquarter	12	6	8	23
Anthrax	20	6	14	8
Foot-and-Mouth Disease ..	8	4	1	44
Horse Sickness	2	3	9	10
Ulcerative Lymphangitis ..	—	1	—	—
Contagious Abortion	12	9	1	11
Kikuyu Fowl Disease ..	1	1	—	—
Swine Fever	—	1	1	2
Redwater	18	16	11	17
Anaplasmosis	10	18	6	10
Paratyphoid	4	4	3	3

NAIROBI

Disease	1933	1934	1935	1932
Rinderpest	7	22	11	25
East Coast Fever	32	30	16	6
Epizootic Lymphangitis ..	6	—	—	—
Ulcerative Lymphangitis ..	1	11	1	3
Anthrax	5	4	7	4
Bovine Pleuro-pneumonia ..	1	—	1	—
Horse Sickness	—	6	—	3
Blackquarter	1	—	5	1
EquinePiraplasmosis	1	—	5	2
Trypanosomiasis (Bovine) ..	5	2	1	3
Haemorrhagic Septicaemia ..	2	2	3	1
Foot-and-Mouth Disease ..	3	1	2	2

Tuberculin Tests (Bovine)

Tuberculin tests were carried out in the various districts as follows:—

	Imported Cattle	Other Cattle
Nanyuki ..	23	9
Nakuru ..	43	—
Nairobi ..	22	—
Eldoret ..	9	—
Lumbwa ..	2	—
Machakos ..	4	9

Mallein Tests

Isiolo .. 12 Horses and Mules

Dip Tests

Dip analyses were carried out at field stations as follows:

	Samples
Nanyuki	282
Thomson's Falls ..	428
Naivasha	54
Lumbwa	83
Masai Reserve ..	70,694
Samburu	62,000
Isiolo	6,261
Total ..	138,954

RETURNS FROM THE GOVERNMENT DIPPING STATIONS FOR THE LAST FOUR YEARS

Station	Equines				Cattle				Sheep and Goats			
	1933	1934	1935	1936	1933	1934	1935	1936	1933	1934	1935	1936
Nakuru	438	592	698	372	2,179	1,783	3,160	3,831	40,066	25,921	24,942	29,950
Isiolo	98	89	104	7	—	—	—	9,891	41,716	57,718	56,184	68,273
Nanyuki	—	—	—	—	25,260	18,489	571	—	—	—	—	—
Rumuruti . ..	—	—	—	—	9,768	3,617	3,502	5,288	—	—	—	122
Thomson's Falls ..	—	—	—	—	—	—	—	—	—	—	—	—
Naivasha	—	—	—	—	18,390	19,814	22,557	30,649	13,453	21,133	16,401	11,869
Totals ..	536	702	802	259	55,597	43,703	29,790	49,659	95,235	104,772	97,527	110,092

East Coast Fever Testing Stations

Kibigori

Owing to an outbreak of foot-and-mouth disease it was necessary to close the Kibigori Quarantine during August and September, but this did not cause any great inconvenience at a time when outward movement of stock from the reserve was virtually at a standstill. The number of heifers exported via the Quarantine is a new low record, and is directly attributable to improved economic conditions within the reserves.

The reduction from Sh. 10 to Sh. 5 in the fee for East Coast fever testing and branding, which became effective late in 1935, has led to a fifty per cent increase in the number of oxen brought into the Quarantine for the L.T. brand, but traders have found difficulty in disposing of these animals in the settled areas.

Tested and Branded—

	1934.	1935.	1936.
Trade and Farm Cattle ...	470	612	984

Machakos

The station remained open all the year. Grazing became scarce during the last six months, but with an adequate water supply sufficed to carry the cattle admitted for treatment.

765 cattle were tested on their immunity to East Coast fever and branded accordingly.

Brands

The number of stock brands supplied during the year was as follows:—

European

"S" Brands	13
Renewal Brands	19
Brands Registered	49
Brands Transferred	3

Native

Brands Registered	2

Permit System

During the year the following changes took place in the personnel of honorary permit issuers:—

Remaining 31st December, 1935 ...	141
New Appointments	20
Resignations	10
Deceased	4
Remaining	147

The grateful thanks of the Division are extended to all honorary permit issuers for valuable assistance rendered during the year.

SECTION II—NATIVE RESERVES

Staff Distribution

During the year the European staff was distributed as follows:—

District	Veterinary Officer	Stock Inspector
Central Kavirondo	1	1 (Maseno)
North Kavirondo	1	1 (Sangalo)
South Kavirondo	—	1
Machakos	1	1
Samburu Reserve	1	1
Baringo Reserve	—	1
Nandi Reserve	—	1
Elgeyo Marakwet	—	1 (Ngong)
Masai District	1	3 (Kajiado) (Narok)
Kibigori	—	1
Isiolo	—	1
Total ..	5	13

The Coast Province is staffed by one Veterinary Inspector and three Veterinary Assistants.

Disease

Rinderpest

The position as regards rinderpest cannot be considered entirely satisfactory, in view of the potential danger which exists in the presence of large numbers of susceptible cattle.

This is particularly the case in North Kavirondo, where inoculations have not been carried out in many locations for at least three years, and, in the absence of reports of extensive natural outbreaks in these areas during that time, it must be assumed that there are very few immune animals to be found there. North Kavirondo has been remarkably free from rinderpest in recent years, but this has served to increase the danger of a major epizootic.

In Central Kavirondo regular inoculations have been carried out in all locations for a number of years, and as a result large concentrations of susceptible cattle do not occur in any part of the Reserve. This balance of susceptible and immune stock, however, shows a tendency to be upset in

some locations, where freedom from natural outbreaks has induced an unjustified sense of security, with a consequent reluctance to spend money on the immunization of the yearly increase.

In South Kavirondo, with its highly developed hide and dairying industries, the available staff has been unable to make any real impression on the rinderpest position. Transport difficulties, which in some cases led to unsatisfactory reactions owing to a loss in the viability of the virus, and difficulties in the collection of revenue, made it impossible to elicit that ready response so necessary for a successful programme of immunization in a new area.

Rinderpest was active in all locations of South Kavirondo and its effects were noticeable in a way not previously commented upon. Not only was there an appreciable decrease in the output of ghee from the affected areas, but South Kavirondo hides lost favour in the eyes of the trade, not because of faulty preparation, but because the proportion of fallen rinderpest hides had entirely upset the normal ratio of first and second quality hides to those of lower grades.

In the Masai Reserve, as in previous years, vaccination with a single dose of field-prepared vaccine was used, with excellent results. Some few hundred head of cattle, however, were treated at Ngong with vaccine virus; reactions were severe and the mortality was high. Most of the natural outbreaks in the reserve were of a mild type and were dealt with by quarantine only. In fact, in certain instances, the disease was deliberately spread to neighbouring herds, in order to hasten its termination and to obtain permanent immunity. A dose of 15 c.c. of vaccine was recommended for vaccine-virus inoculations. When suitable arrangements can be made for the storage of vaccine and virus in the field it is proposed to introduce the vaccine-virus method of immunization.

Six outbreaks, most of them at the end of the year, were reported from the Kajiado district; there were three at Ngong, and a few at Narok. It is not possible to give accurate numbers for those at Narok. Several of the Kajiado outbreaks originated from Kitui and Wakamba heifers which were bought by the Masai.

Difficulty was experienced in the first part of the year in getting susceptible animals for vaccine-making, and consequently most of the outbreaks were dealt with by means of quarantine alone. Near the end of the year, however, animals were obtained, and 57,135 c.c. of vaccine prepared.

The Machakos and Kitui Reserves are rarely free from rinderpest. The outbreaks during the year were not numerous, and mortality was low. Some 800 head of cattle were immunized by the double inoculation method.

Sporadic outbreaks continued in the Samburu area, but again the mortality was low. Immunizations were not carried out to any appreciable extent. It was observed that animals which had been treated with vaccine alone two years ago showed susceptibility towards the end of the year.

Outbreaks of rinderpest were frequent in the Kamasia district, and in some cases the mortality was severe. Some 7,000 head were double inoculated at one centre.

In the Lumbwa district, the Belgut and Buret Reserves remained practically free from rinderpest during the year. The Sotik Reserve, however, experienced a general epidemic. The natives of the Belgut and Buret Reserves have their stock inoculated annually, whereas the Sotik natives present very few cattle for inoculation.

Natives of the Sotik Reserve were persuaded to present about 100 head of stock for double inoculation. This is the first occasion on which stock have been inoculated in this area since 1922. The inoculation was a success, and it is hoped that this object lesson will gain the confidence of the natives. The annual double inoculations were well supported in other reserves. Reactions were excellent, and the mortality was 1.5 per cent.

Outbreaks of rinderpest were also reported from West Suk, Turkana and from the Coast Province.

	Double Inoculation	Serum Alone	V.B. Tests	Vaccinations	Vaccine and Virus
Central Kavirondo ..	13,517	—	—	—	—
North Kavirondo ..	1,944	—	—	—	—
South Kavirondo ..	2,530	—	—	—	—
Masai Reserve ..	—	—	—	1,211	200
Machakos Reserve ..	800	—	—	—	—
Lumbwa Reserve ..	7,397	—	—	—	—
Nandi Reserve ..	6,957	—	97	—	—
Elgeyo and Marakwet	1,091	—	—	—	—
Baringo Reserve ..	7,456	—	—	—	
Samburu Reserve ..	—	—	—	2,604	
Nairobi (Kikuyu) ..	851	—	—	—	—
Isiolo	1,041	—	—	—	—
TOTAL ..	43,534	—	97	3,815	200

Contagious Bovine Pleuro-pneumonia

The position in regard to this disease is more encouraging, and it may now be stated that outbreaks were not reported from any native area outside the Northern Frontier district including Samburu, and Masailand, during the year.

In Samburu and Masailand the disease is prevalent and has existed for several years, despite tribal methods of quarantine and vaccination.

Experience indicates that the eradication of pleuro-pneumonia is a comparatively simple matter in the course of time, provided facilities are available for slaughter of the clinically infected and segregation and vaccination of in-contacts. An animal must not be permitted to recover, since an apparently recovered animal may become a source of infection.

In actual practice, however, as far as the infected native areas of the Colony are concerned, the influences which obstruct eradication in this manner are almost insurmountable. The tribesman places a very high value on an animal which has recovered from disease, and will not readily countenance slaughter of the clinically infected. Segregation usually means the necessity for providing a large grazing area, with an adequate water supply, continuously or for long periods—facilities rarely, if ever, available in dry arid pastoral areas. Opposition to vaccination is gradually disappearing; in fact, this service is now frequently demanded in Samburu and the Masai Reserve, and it is in this direction that the greatest progress towards eradication may be expected.

It is proposed to extend considerably the vaccination programme in the immediate future.

It has, however, been possible, under careful supervision and escort, to release large numbers of cattle from the infected areas for slaughter. No breeding cattle have been so released.

The extensive vaccination campaign commenced in Samburu during 1936 was completed during the earlier part of the year. Vaccination centres were arranged at Baragoi and Wamba. In certain instances it was possible to destroy clinically infected animals.

The three-dose method of vaccination in conjunction with quarantine has been continued in the Masai Reserve. Local quarantines were imposed in the Narok, Loitokitok and

Kedong districts. Outbreaks were not reported from any other district of the Masai Reserve. Two cases of the disease were, however, reportd from Kajiado—one in trade cattle and one amongst Government work oxen. The infected animals were destroyed and no extension of the disease occurred.

In two instances only pleuro-pneumonia assumed serious proportions, causing high mortality. The outbreaks occurred at Kuaso Nyero and Makalia in the Narok district. The mortality in the first outbreak was undoubtedly indirectly due to a delayed report, and in the case of the Makalia outbreak to the fact that rinderpest appeared as an intercurrent infection.

In all other outbreaks mortality has been very low, estimated at about 2 per cent of the infected herd. The practice has been to vaccinate the infected herd immediately, and subsequently to vaccinate all herds in the vicinity of the outbreak. This procedure has been highly successful in preventing the spread of the disease, and has completely gained the approval and confidence of the Masai.

During 1935, in which year pleuro-pneumonia invaded the Loitokitok area, a satisfactory change in the attitude of the Masai towards vaccination became apparent. This has, during 1936, strengthened and extended throughout the Kajiado district. It is now considered that a general vaccination campaign would be appreciated and that little opposition would be experienced.

Ten outbreaks of the disease occurred in the Masai Reserve during the year.

IMMUNISATIONS AGAINST CONTAGIOUS BOVINE PLEURO-PNEUMONIA IN NATIVE RESERVES

Masai Reserve	70,694
Samburu	62,000
Isiolo	6,261
TOTAL ..	138,954

Rabies

There were two confirmed cases of rabies in the native reserves or native areas during the year, one of which occurred in North Kavirondo and the other in Moyale, Northern Frontier District.

Central and South Kavirondo remained free, but the periodical distribution of poisoned baits in the neighbourhood of markets and hide *bandas* was continued as a precautionary measure.

In North Kavirondo the positive (and one suspicious) case occurred in the Kakamega Township, in each instance the affected animal being a domestic cat owned by a European. Four Europeans and three Africans underwent treatment.

Intensive poison baiting was undertaken in the township and environs from July until October, and the Rules under the Suppression of Rabies Ordinance were applied in the township until the end of November. Of the 22,000 baits laid, 7,616 were taken, with a known mortality of 128 dogs, 126 jackals, 166 domestic cats, 256 wild cats (including viverrines), and 64 others.

The rabies quarantine kennels at Maseno, empty at the beginning of the year, were filled to capacity from June onwards. Thirteen dogs and one cat entered for quarantine, of which ten dogs completed the requisite period and were released; one died in quarantine, and two dogs and one cat remained at the end of the year.

The sources of origin of the quarantined animals were as follows:—

	Dogs.	*Cats.*
Eldoret	3	—
Kakamega	4	1
North Kavirondo Mining Area	5	—
Central Kavirondo, north of Yala River	1	—

The affected animal in Moyale was a cow, previously bitten by a suspected rabid dog. Suitable material from the dog was not available for diagnosis.

Concerning this case the District Commissioner, Moyale, reported as follows:—

> "The history of this cow is that it was bitten with seven others on the night of 12th-13th September by a dog supposed to be suffering from rabies. The eight beasts were isolated and placed under observation. On the 13th October, 1936, this cow refused water and did not eat. On the 14th October, 1936, it showed heavy saliva about the mouth (exactly like the suspected dog). On the 18th October, 1936, this cow died. During the interval it had attempted at least twice to drink water but could not do so; it was unable to eat."

No further vigorous suspicious cases were reported from Moyale, but immediate action was taken by the Administration to destroy all stray dogs and vermin as far as possible.

The total number of cases of rabies confirmed in the Colony was six, as compared with seventeen confirmed cases the previous year.

Blackquarter

This disease is also prevalent throughout the native reserves. A fairly extensive outbreak involved the Central Kavirondo locations of Asembo and parts of Seme, Uyoma and Sakwa during May and June. A total of 1,025 head of cattle was immunized in these locations, but the value of the vaccine is not yet sufficiently appreciated.

In South Kafirondo some deaths occurred in Mumbo, but neither there nor in North Kavirondo has any preventive action been possible.

Outbreaks of the disease were reported from the Masai Reserve and Baringo. In the latter district some 1,334 vaccinations were carried out, and in the Masai Reserve 427 head of cattle were vaccinated.

In the Lumwwa Reserves the year 1936 was a very wet year and this no doubt had much to do with the high mortality which resulted from blackquarter. Veterinary scouts with supplies of vaccine toured the various reserves. The natives were keen to vaccinate their stock and the service proved very popular.

Foot-and-mouth Disease

The cattle in the Masai Reserve appear to have a certain immunity to the disease, which observation is borne out by the fact that although foot-and-mouth disease may gain entrance to a herd it does not sweep through the whole herd as it does, for instance, in more highly bred animals. Further, it is rare to find animals with the foot lesions, though mouth lesions may be, and often are, severe. Two outbreaks occurred at the Ngong Station.

The Masai take little or no notice of the disease, since mortality is not serious and is practically confined to suckling calves, which succumb to an enteritis.

Wherever possible, foot-and-mouth disease has been dealt with by quarantine, although control has not been highly successful owing to the unconcern with which the Masai view the disease.

In Central Kavirondo the disease appeared on the Nandi border in the South Teriki during August, and from this focus spread to the Kano Plains, the Kibigori Quarantine,

through the Kisumu location, and well into Seme before the extension was checked by the imposition of local quarantine. It was unfortunately necessary to close the Kibigori Quarantine Station during August and September as a result.

In general, mortality was negligible, but the effects of the epizootic were shown by a noticeable decrease in the ghee output from th locations affected, and recovery in this respect is not yet complete.

In South Kavirondo, foot-and-mouth disease appeared among Government oxen in the Kisii Boma. Infected cases were isolated and a general extension prevented.

During November an outbreak occurred in the Baringo district which spread throughout the majority of the locations from Hot Springs to the Lembus Forest, thus including part of the stock route from Maralal to Solai. In consequence, it was necessary to prohibit the movement of stock from the Baringo district for some considerable time. This prohibition affected the movement of cattle from Samburu via Baringo to Solai.

An outbreak of foot-and-mouth disease, causing some mortality, was also reported from the Leroghi country of the Samburu district.

Other Diseases

Certain other diseases, such as hæmorrhagic septicæmia, contagious abortion, "turning sickness," snotzeicte, were also reported, but did not cause serious mortality.

An outbreak of caprine pleuro-pneumonia was reported from the Samburu country, involving some 500 goats. The mortality was exceedingly heavy; some 200 animals succumbed.

Trypanosomiasis

This disease is prevalent in Samburu and various parts of the Northern Frontier District, and also in the Kavirondos, Masailand, Machakos, Baringo, and parts of the Coast Province.

Tsetse-fly infested areas are usually well known to the tribesmen, and avoided ordinarily, but in times of drought, causing shortage of water and grazing, such areas are frequently traversed and even grazed as necessity demands. In this way mortality is inevitable.

It is again necessary to draw attention to the spread of trypanosomiasis in Central Kavirondo; the north-easterly extension continues, and cases are now occurring in the North

Kavirondo locations of Marach and Buhayo. In South Kavirondo little is known of the extent of the area infested by testse-flies, but cases of trypanosomiasis were reported from Suna, Kaniamkago, Gwassi, Sakwa, and Kanyada.

Infection in Central Kavirondo appears to be confined to Sakwa, Kadimu, West Alego, North Ugenya and Samia. The presence of the disease is accepted philosophically in most cases, but there has been an encouraging response to suggestions that active steps should be taken in North Ugenya and Samia to preserve from invasion grazing areas now being threatened by tsetse-flies. The proposal is that the Local Native Council should purchase the necessary implements, and that with voluntary labour an attempt should be made to clear a belt on the eastern bank of the River Gaula in North Ugenya. In Samia no attempt to clear already infested areas is contemplated, but the removal of the numerous isolated clumps of trees in the park-like country west of the Nzoia River near Luambwa would serve to provide an open space of several thousands of acres on which cattle could graze in relative safety. It is believed that this also can be achieved with the use of voluntary labour if the implements can be provided.

The number of cattle treated for trypanosomiasis in North Ugenya and Samia and showed a further rise from 961 head in 1935 to 1,276 in 1936; as each animal receives four intravenous injections, this reflects credit on the native veterinary staff responsible for this work in addition to routine duties.

It was again possible to facilitate work on the Port Victoria reclamation scheme by arranging for the regular inoculation of the work oxen employed there.

The south-eastern part of the Machakos Reserve is probably permanently infested with tsetse-fly, and supports only a very small cattle population. As part of the reconditioning scheme, it is proposed to begin clearing work on a small scale in an area in this part, which is suitable for cotton growing, partly by paid labour, and partly by inducing natives to go there and grow cotton. As many goats as possible will be sent there, and if success attends these measures a more extensive area will no doubt receive attention.

The extension of the tsetse-fly areas in the Masai Reserve has been the cause of much anxiety, particularly in the western portion of the reserve. Since 1934 the Mara Valley fly belt has

spread rapidly, so that "fly" is now encountered within four miles of Barakitabuk, and has thus rendered a large tract of country useless. It has also reached as far as the western end of the Lemek Valley. There is thus great danger of the Lemek Valley becoming infested—this area would readily lend itself to the harbouring of tsetse-uy—and so rendering impossible for grazing purposes a large tract of otherwise excellent cattle country. This rapid extension of the chief "fly" area of the western portion of the reserve constitutes a very real danger to the Purko country.

The Masai do not seem to appreciate the seriousness of the position. For instance, a Trans Mara Masai moved his cattle over the river through the fly belt and settled in the western end of the Lemek Valley. Fortunately, this movement was observed on the day of arrival. Twenty cattle of the herd were found subsequently to be suffering from trypanosomiasis. Proposals for treatment made to the owner were rejected. The herd was immediately returned to the Trans Mara.

In Samburu tsetse-flies were caught at Wamba and on the banks of the Uaso Nyiro River, and forwarded for identification. Trypanosomiasis is fairly prevalent amongst stock at these places and causes some mortality; no curative treatment was, however, attempted.

In the Baringo district, a number of animals died from the disease, in herds which had grazed at or near the Kerio and Amaya Rivers.

Many cases were observed at the Coast amongst slaughter cattle from the Tana River and Kitui districts. Some cases also occurred amongst dairy herds. Treatment with Antimosan and "Surfen C" gave good results.

East Coast Fever

East Coast fever is not controlled by quarantine, dipping or movement restriction within the native reserves regarded as enzootic areas. Such areas are the native reserves of the Rift Valley Province excluding Samburu, the native reserves of the Central Province, Masai Reserve, and the native reserves of the Coast Province.

The disease is most prevalent in the densely populated agricultural districts, e.g. the Kavirondos and Kikuyu, and least prevalent in parts of Masailand, Kamasia and Kitui, more purely pastoral areas, with a much smaller rainfall.

In the enzootic areas East Coast fever is usually contracted during calfhood, when a very much higher resistance appears to be available, than in the adult stages. In the latter stages mortality may be 80 per cent or higher, whereas in calves on milk diet which have not reached the weaning age mortality is usually in the neighbourhood of 40 to 50 per cent. The disease may, however, at this time be complicated by intercurrent infections. Control is not attempted because of the vast extent of the infected areas, the enormous financial outlay which would be required to provide an adequate number of dipping tanks, and the higher value of recovered cattle for transport and other purposes. Recovered cattle are for all practical purposes regarded as permanently immune.

Nevertheless, many natives, particularly natives who have had an opportunity of seeing for themselves and studying the value of dipping, either on European farms or in veterinary training centres, appreciate its advantages, not only for the prevention of tick-borne and other parasitic diseases, but also for the prevention of the vast tick infestations which cause enormous damage to hides and the milk glands.

Certain natives in Central Kavirondo have actually asked for the provision of dipping facilities, and in Masailand some advantage is taken of dipping facilities available at Ngong.

As a disease control measure dipping, unlike, say, vaccination against pleuro-pneumonia, is entirely foreign to tribal custom and tradition, and although the time is not yet ripe for the promulgation of any comprehensive dipping scheme in native reserves, it is, however, an excellent sign that the native mind is gradually turning to modern methods of disease control.

Anthrax

Anthrax exists in all the native reserves and native areas, but during the year no serious mortality was reported. Vaccination is not generally demanded as a service, but occasionally it is requested when an outbreak occurs.

Sporadic outbreaks of the disease were reported from the Kavirondos.

The incidence of the disease was high in the Lumbwa Native Reserves, but attempts to encourage vaccination were not successful.

The disease was not reported from the Masai Reserve or Samburu.

Authrax vaccine is not issued free of charge.

Dairy Industry

The dairying industry in native reserves mainly implies the conversion of milk, surplus to human and animal requirements, into an easily marketable product unhampered by the climatic and sanitary conditions prevalent in the cattle-breeding areas. Such a product is ghee. No attempt is made to market butter. Milk is occasionally marketed in small quantities in the neighbourhood of large settlements. The milk supplied by natives to Nairobi and Mombasa is, however, appreciable in amount.

The ghee industry in the dry, purely pastoral areas such as Samburu, the Masai Reserve and Kitui has not made rapid progress, nor is such progress to be desired, since an exceedingly low rainfall is not conductive to milk surplus and intensive stimulation of the industry in these circumstances might easily lead to human and animal deprivation. Nevertheless, in these areas, during the occasional short periods of abundant rainfall when milk is plentiful, the manufacture of ghee is encouraged, and dairy units are provided as finances permit at suitable centres.

The Kavirondos are the main ghee-producing districts of the Colony, particularly Central and South Kavirondo. In these districts, where the conditions are extremely favourable —dense human and cattle populations, high rainfall, extensive crop production—the industry has reached a high state of development and is a source of considerable revenue to the tribesmen.

The volume of ghee exported from the Colony has never reached material proportions, the total exported during 1936 being 3,814 cwt. The volume of imported ghee was 9,862 cwt.

The imported ghee came mostly from Tanganyika, with a less quantity from India. The internal markets therefore absorb practically the entire output, in addition to that imported. This position is not altogether satisfactory, since it subjects the price to considerable fluctuations. During the year the product reached Sh. 36 (Nairobi) per frasila (36 lb.)—more than 100 per cent above the lowest 1935 quotation.

The manufacture of ghee in native reserves is encouraged by the provision of dairy units at suitable centres. A dairy unit consists of a churn, separator, and accessory equipment, housed in a simple temporary or permanent structure. The capital expenditure is usually provided by Local Native Councils, or in some instances by enterprising natives. The pay-out to the milk suppliers is controlled to ensure a fair return,

depending on the price of ghee, and the number of dairies in any one district is controlled, to eliminate any uneconomic form of competition which might lead to failure of pay-out.

An export trade would tend to stabilize the price in local markets and assure the native producer a better price for his milk in times of high rainfall and plentiful grazing.

Export markets have been fully explored in many countries; reports on sample consignments forwarded have been favourable, but all prospective buyers require an assurance or guarantee of standard quality, an assurance which cannot be given pending the proper organization of the industry in that respect. This matter is, however, under investigation.

The total number of dairies established throughout the Colony at the end of the year was 772, distributed as follows:—

	Dairies.
South Kavirondo	560
Central Kavirondo	163
North Kavirondo	23
Machakos	3
Kitui	1
Masai Reserve	6
Samburu	5
Baringo	2
Coast Province	4
Nandi Reserve	3
Tambach District	2
Total ...	772

The total output of ghee from these dairies amounted to approximately 10,000 cwt.

A demonstration in the preparation of ghee was given at the Royal Agricultural and Horticultural Society's Show, held at Nakuru in June, by pupils of the Ngong Training Centre.

Samples of Kenya prepared ghee were exhibited in the Kenya section of the Johannesburg Empire Exhibition, 1936.

South Kavirondo

Some 106 new dairy licences have been issued during the year, and many applicants were refused as unsatisfactory or undesirable. Approximately 560 dairies operated during the year.

Several natives have been charged before Local Tribunals for operating unauthorized dairies, and have been fined small sums. This has been necessary in order to protect licensed dairy-owners, and to stop uneconomic competition.

It is considered that definite improvement in cleanliness and preparation has been made, but it is felt that a long time must elapse before conditions generally are ideal. It has been very encouraging to find that a great number of dairy owners make genuine efforts to keep their premises and utensils clean and to note pride in the possession of model native dairies.

The work of inspectors at the lake ports has given satisfaction, and Indian traders have continued to pay a bonus of 50 cents per tin passed by the inspectors.

Eight new dairies have been opened in Bakoria Location and are doing well.

Nineteen dairy outfits have been purchased from Local Native Council funds and issued to natives of this reserve on easy terms.

No difficulty has been experienced in collecting instalments due on dairy equipment, and during the year Sh. 3,997/40 has been collected and paid in to the Local Native Council.

Total exported: 19,818 tins of 40 lb. net content.

Total number of frasilas: 22,020.

Average value per frasila: Sh. 21.

Total value of 22,020 frasilas at Sh. 21 per frasila: £23,121.

Central Kavirondo

Expansion was most marked in East Alego and Uyoma, but every location showed an increase in the number of working dairies. Control of prospective dairies has been made possible only by a strict enforcement of the Central Kavirondo Dairying Rules.

The erection of standard dairies of the South Kavirondo pattern was begun in December, and thirteen had been completed by the end of the year. Dairy licences will, after the end of 1937, be issued only to those people who have housed their equipment in these standard buildings.

Some 163 dairies operated during the year, and the output of ghee was 6,122 tins of 40 lb. net content.

An extensive outbreak of foot-and-mouth disease throughout the reserve caused the output of ghee to be considerably diminished.

The relatively small output from the Kisiani dairy during the last few years, due to increased sales of milk in Kisumu Township, hardly justified its maintenance as a Local Native Council unit with a whole-time employee, and in December, 1936, after the matter had been referred to the Local Native Council, the dairy was handed over to a private individual.

The total amount of milk handled at the dairy during the year was 7,289.4 gallons, and improved prices for ghee during the latter half of the year made it possible to increase the rate of payment from 15 to 20 cents per gallon.

The total output of ghee was 3,653 lb.

North Kavirondo

Ghee production has undergone two great changes during the year. The upward curve, commenced in 1933, stimulated in 1934, maintained fairly steadily in 1935 and until March of the present year, suddenly dipped sharply, and from a steady supply of over 200,000 lb. per month during the peak months (say, November to February), dropped to 60,000 lb. by July, and had by the end of the year recovered to 106,000 lb. only.

Some 23 dairies operated during the year, and the output was 1,209 tins of 40 lb. net content. In addition, large quantities of cream are now sold direct by natives to the Elgon Creameries at Malakisi.

The estimated value of the total output of ghee from the Kavirondos is approximately £32,000.

Machakos

Three new field dairies were opened during the year, one in Kangundo Location and two in Mukaa Location. The price of milk paid to the suppliers varies with the price of ghee; thus in January it was 16 cents for 10 lb. and rose to 24 cents for 10 lb. in December. Of the two dairies opened in Mukaa, the one at Nzai is doing fairly well, while the one at Emali has tended to decline. To some extent this is due no doubt to conditions of drought, and it is to be hoped that with the advent of good rains it may revive.

The amount of ghee produced was 109 tins. The price rose from Sh. 21 per tin in January to Sh. 32/50 a tin in December.

Masai Reserve

The operation of dairies in the reserve has not been very successful during the year. Following on years of drought the herds were greatly depleted, with a consequent drop in milk production. In the Narok district six dairies operated for an average of three months in 1936. This represents approximately the maximum time that dairies can be operated in the reserve, and coincides with the flush of grass which occurs after the rain, i.e. April, May, June. The length of time which the Mau dairies can be operated depends upon the annual migrations of the Masai rather than on the rainfall.

The production amounted to 90 tins, the sale of which realized Sh. 1,890.

Samburu

Five dairies operated at suitable times during the year. Some 474 tins of ghee were produced, realizing Sh. 7,503/96.

Baringo

Two dairies were opened, but output and support were negligible.

Coast Province

Four field dairies operated during the year, and produced 215 tins of ghee.

At Mariakani Veterinary Station some 145,643 gallons of milk were inspected and forwarded to Mombasa.

Nandi Reserve

Three dairies operated. The output was small, and enthusiastic support from the natives was lacking.

HIDES AND SKINS

The value of exported hides and skins for the last four years was:—

1933	£117,124
1934	£195,324
1935	£179,387
1936	£191,421

The volume of hides exported during the year was 52,462 cwt., as compared with 80,684 cwt. in the previous year. The decrease was mainly in respect of sun-dried hides, and was chiefly due to less mortality from drought conditions.

The volume of skins exported showed a sharp rise from 1,197,482 pieces in 1935 to 1,796,796 pieces in 1936. The increase was mainly due to better prices and better quality as a result of shade-drying.

The price of hides showed an average increase of approximately 30 per cent over the average price the preceding year. The price of skins marked more than 100 per cent higher than the previous year. Hides are sold by the frasila (36 lb.); skins are sold by the piece. Shade-drying is the method of preparation advocated, and this is required by law where adequate facilities have been provided. This practice is being gradually extended to include goatskins.

The Hides and Skins Rules, 1931, and the Hides and Skins (Amendment) Rules, 1936, of the Crop Production and Live Stock Ordinance, 1926, have now been applied to the following districts:—

Masai District,
Machakos District,
Kitui Native Reserve,
Embu Native Reserve,
North Kavirondo District,
Central Kavirondo District,
South Kavirondo District,
Samburu District.

These Rules, while perhaps not sufficiently comprehensive to cope with all the difficulties presented, are nevertheless of great benefit to the industry generally, and in certain districts they have been supplemented by Local Native Council resolutions.

Some 360 hide shade-drying sheds have been erected in the native reserves, with a distribution as follows:—

Central Kavirondo	82
South Kavirondo	80
North Kavirondo	80
Machakos	27
Kitui	15
Masai District	55
Samburu	7
Baringo	6
Lumbwa	4
Nandi	1
Coast	3
	360

Instruction in flaying and the preparation of hides for marketing forms an important part of the curriculum of the African Veterinary Training Centres, and many of the natives so trained are placed in charge of the hide-drying sheds.

All three methods of shade-drying (i.e. frame, east to west pole method, and suspension on poles) are under close observation and experimentation, and from the experience already gained it would appear that the frame method of shade-drying is the most efficient.

The more important deterrent influences to the industry are:—

(i) Mutilation of hides by brands—a tribal custom for identification or disease control;

(ii) Prevalence of skin lesions caused by disease, tick and other parasitic infestations;

(iii) Want of discrimination between hides of "fallen" animals and hides from animals slaughtered for meat consumption;

(iv) Undue delay in taking the hide after flaying to a shade-drying shed, inducing "hair-slip" and putrefaction;

(v) Absence in many districts of adequate slaughtering facilities. It is a common practice to flay in the recumbent position and to eviscerate the abdominal contents on to the hide, thus causing staining by blood and ingesta.

There can be no doubt that the elimination of these and other minor difficulties would materially result in increased financial benefits to the tribes. Improvement is to be expected in this way, and it is the aim of the Division of Animal Industry to proceed persistently with propaganda, demonstration and training at veterinary schools, with the aid of such legislation as may be required.

In June, 1936, the Hides and Skins Rules were amended to include a new rule which makes it an offence for any trader to buy or sell any hide which is in a condition unfit for storage or shipment owing to being incompletely dried. The necessity for such a rule has long been emphasized, and its introduction has afforded a valuable safeguard against the export of apparently sound hides in which unobserved putrefaction has occurred.

South Kavirondo

General improvement in flaying and standard of preparation has been noted, and few complaints have been received from buyers. Four permanent hides sheds were erected at Rangwe, Kisii (two), and Kochia. Most of the old *bandas* have been demolished and re-erected, and eight new *bandas* have been built and opened during the year at Rusinga Island, Mfangano Island, Gwassi, Kadem, Suna, South Mugirango (two), and Mumbo. The increased prices have induced many more natives to take up hide-buying as a trade, and due to the increased competition local producers have obtained better prices.

The number of hides prepared during the year exceeds that of last year by 2,116 pieces, and represents an increased value over last year of Sh. 67,153.

There are now 80 shade-drying sheds in South Kavirondo.

Central Kavirondo

A marked improvement in the standard of preparation of hides has taken place during 1936. The Local Native Council passed at their March meeting a resolution to the effect that no person not in possession of a certificate of competency issued by the Veterinary Officer should be allowed to clean hides in Local Native Council *bandas*. This has proved most valuable, and has acorded satisfactory control over the hide cleaners, with marked results.

With the Sh. 5,000 voted by the Local Native Council for 1936, new permanent hide *bandas* were erected at Kanyando, Luhano, Gombe, Kibigori, Randago, Usigo, Nyamungo, Gotregea, Nyabera, Gabalela, Bwanda, Ajigo, Ojuok and Nyaware, while the *banda* in Mambo Leo Market, Kajulo, was extended from 24 ft. to 48 ft. in length. The provision of Sh. 2,000 for 1937 should enable the building programme to be completed.

There are now 82 shade-drying sheds in Central Kavirondo.

Goatskins

Partly owing to an increase in the numbers of shade-dried goatskins being produced, but chiefly owing to the advent of a new competitor in the market, the price of goatskins rose from Sh. 16 a score to as high as Sh. 36 at the end of the year. This has stimulated shade-drying, and in Central and South Kavirondo the stage has now been reached

when it is possible not only to apply but to enforce the Hides and Skins Rules in respect of skins. In North Kavirondo at least a further six months' grace is necessary.

The principles of the campaign for the shade-drying of skins are that the use of existing hide *bandas* is encouraged, but is not compulsory, the only requirements so far being that the skin must be dried in a frame in the shade. These skins are easily identifiable, and need not be confused with sun-dried skins.

North Kavirondo

During the last quarter of the year many demands were made for permanent *bandas,* whilst a campaign to provide a number of temporary *bandas* (in the cotton-growing areas particularly) met with ready response.

Thirty-two temporary *bandas* have been pegged out since October, of which twenty are in cotton areas.

In places as far removed from the cotton area as Kamakoya and Makema (towards the borders of the Lugari settled area), and in Tendettis country on the Elgon slopes also, building has commenced.

There are now 80 hide-drying *bandas* in North Kavirondo.

HIDES AND SKINS EXPORTED, 1936 :—
KISUMU AND BUNGOMA
FIGURES COMPILED FROM TRADE REPORTS

	Central Kavirondo	South Kavirondo	North Kavirondo	Other Districts
Shade-dried Hides—				
Pieces	58,647	33,356	51,356	949
Weight in cwt...	6,510	3,800	5,700	135
Value in Sh. ..	429,600	250,800	376,200	8,800
Sun-dried Hides—				
Pieces	2,659*	849*	†12,910*	5,832
Weight in cwt...	120	40	640	280
Value in Sh. ..	4,320	1,400	23,000	9,700
Percentage of Hides Shade-dried ..	97	99	80	14
Shade-dried Skins—				
Pieces	6,725	3,688	465	2,245
Value in Sh. ..	7,700	4,420	530	2,700
Sun-driedSkins—				
Pieces	90,528	84,947	35,934	3,618
Value in Sh. ..	86,500	80,700	34,000	3,200
TOTAL VALUE IN SH. OF HIDES & SKINS	528,000	337,000 = 1,323,000	434,000 or £66,150	24,000

*Shade-dried hides under 2 lb. in weight classified as sun-dried.

†Includes sun-dried *ex* Trans Nzoia and Eldoret.

Masai District

A concentrated effort was made in the Narok district in regard to the shade-drying of hides, and at the end of the year the district was completely equipped. Forty-two sheds were in operation, and it was possible to enforce the Hides and Skins Rules.

During the year 2,483 frasilas of hides were exported through Kijabe from the Narok district. Approximately 6,500 of these hides were treated in the *bandas* and, allowing for an average weight of 11 lb. per hide, this represents 2,000 frasilas shade-dried.

There was a considerable drop in the total weight of hides exported in 1936 compared to that of 1935, but this can largely be explained by the fact that 1936 has been a good year, with no mortality from starvation, etc., such as occurred in previous years.

In the Kajiado district, with the exception of a *banda* at Ngong, no *bandas* were erected. The Kajiado Local Native Council funds were severely strained by famine relief measures in 1934-35 and its funds were very low. However, the 1937 votes include £150 under this service.

The east-and-west pole system of drying hides introduced in the Kajiado district in 1935, while promising success at first, later proved a failure. Not that the system itself was bad, but because the Masai could not be trusted to carry it through properly without constant supervision. Had it been possible to give the system constant supervision in every *boma,* it is considered that the hides turned out would have approached very closely in quality to those dried in *bandas.*

Machakos

Some progress is being made in this district as is shown by the following comparative figures for shade-dried hides:—

	1934	1935	1936
Hides..	9,273	13,613	27,160
Skins	4,280	8,914	24,690

Prices of hides varied during the year from 40 cents per lb. in January to 57 cents in December.

Prices at six-monthly intervals during the past two years have varied as follows, in cents per lb.:—

	January	July	December
1935 ..	30	38	40
1936 ..	40	40	57

These prices are Machakos quotations for "shella-bella" trading. Prices are, of course, lower in other centres in the reserve on account of the allowance to be made to cover transport charges. Four new sheds have been erected by the Local Native Council during the year, also one Indian-owned shed. Two others were erected on the Yatta Plains, as the first step towards checking the movement of sun-dried hides from the Machakos Reserve to Kitui. They will be operated by natives paid by the Local Native Council. All sheds in the reserve are now in the hands of natives who have to make their own profits, as no assistance is given, except as regards equipment. A schedule of rents has been worked out, and in future each shed will be charged rent, according to the number of hides and skins dealt with. The income so made will help to cover the cost of material used and give a small return to the Local Native Council.

Many hides are spoilt by demodectic mange parasites.

Lumbwa

There are four centres in the reserve, but only the Kericho centre is controlled by this Department.

The hides are of good qualitl, and the percentage of first and second grades is higher than in previous years.

Particulars of hides exported:—

Hides from Kericho Centre—

Number of Hides : 942.
Weight : 14,231 lb.
Amount Received : Sh. 6,670/62.

Selection of Hides—

First : 48 per cent. Third : 15 per cent.
Second : 35 per cent. Fourth : 2 per cent.

Average Price Received for Various Grades of Hides—

First : Sh. 22/62. Third : Sh. 14/54.
Second : Sh. 18/50. Fourth : Sh. 7/40.

Samburu

Hide sheds were erected at each dairy centre and other suitable localities, and at the end of the year sheds were operating at Maralal, Poror, Larrgai, Kisimu, Onyala, Nanyuki and Wamba.

Some 1,600 hides were treated by the frame method of preparation, and at Sh. 15 per frasila represented approximately Sh. 2,250 in revenue to the Samburu.

Baringo

Six sheds were erected, but otherwise little progress was made during the year.

Nandi

Approximately 200 hides were treated.

Coast Province

Some 535 hide frames have been made available for native cattle-owners in the Kilifi and Kwale districts.

At Mariakani station 276 hides and 443 skins were shade-dried.

The average prices of hides at Mariakani were as follows: Shade-dried, Sh. 20 per frasila; sun-dried, Sh. 15 per frasila.

DEVELOPMENT

The economic utilization of the vast herds and flocks of this country is constantly exercising the attention of the Division of Animal Industry. The cattle population is estimated to be in the region of 5,000,000 head, whereas the sheep and goat population is undoubtedly greater. There is, in the first instance, the difficulty of finding markets for surplus stock. Elsewhere in the report it has been shown that the beef markets outside the reserves do not absorb more than approximately 30,537 cattle and 65,479 sheep and goats, and since many of these markets are partly supplied by European stockowners, it will be appreciated that the demand for native stock from the reserves is infinitely less than the supply which could be made available. This position is not entirely unacceptable to the native pastoralist, who is usually quite prepared to rest in happy contentment watching his herds and flocks grow and multiply *ad infinitum*.

The factors of limitation are, however, never far distant; droughts and epidemics of disease maintain the inevitable balance always demanded by nature; but, in the meantime, serious if not irreparable damage may be caused to the grazing lands and in stock deteroration. Neither of these ulterior resultants seriously concerns the native; his only desire is to possess the largest possible number of stock in order that

survival may be assured. In favourable years stock populations rapidly increase; in unfavourable years the decimation of flocks and herds is much more rapid.

The native does not consider his grazing grounds in terms of carrying capacity, nor does he consider, in any material form, pasture conservation.

Such a mode of farming cannot persist for any appreciable length of time amongst pastoral communities without causing exacting repercussions on the health and prosperity of existing and, more particularly, future generations. Nor can this mode of farming give way to modern practice until markets are available for native cattle and the native impressed with the necessity of limiting grazing areas to normal carrying capacity and the necessity for reconditioning areas which have deteriorated from overstocking or any other form of bad husbandry.

It is on these broad lines that a native pastoral industry development policy has been formulated, linked up with disease control measures, better methods of animal husbandry and improved water supplies.

The marketing of native cattle, which hitherto has presented an unsolved problem, has now assumed a more encouraging aspect, owing to negotiations *en train* during the year between Government and Messrs. Liebig's Extract of Meat Company, terminating in a decision by the Company to erect and operate a factory in this Colony next year. The proposed factory, it is anticipated, will absorb cattle at the rate of 35,000 head to 45,000 head per annum, and not in any way impinge on local markets.

Pasture conservation through the limitation of stock on certain areas has been attempted in Samburu and the Baringo district with some success, and plans have been made for an extensive scheme of pasture conservation and provision of water supplies in the Masai Reserve, Machakos district, and the adjoining Yatta Plains.

These plans are primarily based on data obtained from a stock census and a survey of carrying capacity of the areas concerned.

Instruction in disease control, animal management and breeding, the preparation of hides and skins for marketing, and the preparation of ghee (clarified butter) is a basic function of African veterinary training centres.

Education

African Veterinary Training Centres

These centres remain five in number, as formerly established, no additional centres having been opened during the year. The European staff consists of a Veterinary Officer and a Stock Inspector or Stock Instructor. The duties of these officers embrace not only instructional work at the centres but also disease control and the supervision and preparation of stock products for marketing in the adjoining native reserves.

Each centre maintains a herd of cattle, representative of types indigenous to the district, which serves for educational and demonstrational work. Milk production is recorded and selected sires made available for service in native herds.

Tribesmen are accepted as resident pupils, preferably those possessing primary educational certificates, for courses of training extending from six months to three years. On the completion of training, pupils are absorbed into the service of the Division, the service of Local Native Councils, private employment, or they may return to their reserves. At some centres flocks of native sheep are maintained for the issue of selected rams, and poultry for the distribution to natives of improved birds.

For long-term pupils the curriculum is extensive, and embraces theoretical and practical instruction in the following subjects:—

(1) Cattle diseases:

- (*a*) Rinderpest, East Coast fever, pleuro-pneumonia, anthrax, and other diseases.
- (*b*) Disposal of dead animals and post-mortem examination.
- (*c*) Preparation of blood slides.
- (*d*) Use of a thermometer.

(2) Veterinary hygiene:

- (*a*) Water; its natural sources and conservation.
- (*b*) Air and ventilation of stock houses.
- (*c*) Buildings, manure pits and drainage.
- (*d*) Disinfectants.
- (*e*) Nutrition.

(3) Anatomy and physiology (elementary).

(4) The production of clean milk.

(5) Milk separation, butter and ghee making.

(6) Uses of cattle and breeds of British cattle.

(7) Herd management:

(*a*) Manner of milking.
(*b*) Management of calves.
(*c*) Rations for hand-fed calves.
(*d*) Management of a bull calf.
(*e*) Selection of a good bull.
(*f*) Management of heifers before and after calving.
(*g*) Points looked for when buying a heifer for milking purposes.
(*h*) Cattle breeding and inbreeding.

(8) Poultry husbandry.

(9) Hides and skins:

(*a*) Uses of hides and skins.
(*b*) Qualities of hides and skins.
(*c*) Faults and defects of Kenya hides and skins.
(*d*) Method of flaying an ox.
(*e*) Method of curing hides and skins.
(*f*) Grading and marketing hides and skins.

(10) Agriculture and economics:

(*a*) Causes and prevention of soil erosion.
(*b*) Grass burning.
(*c*) Paddocking.
(*d*) Beekeeping.
(*e*) Farm book-keeping.

A brief review of the work carried out at each station during the year follows.

Ngong Training Centre

Pupils

There were 24 pupils in residence during the year.

Sixteen pupils completed a two years' course and two pupils a three years' course.

In addition arrangements were also made for eleven pupils from the Church of Scotland Mission, Kikuyu, to take a practical training course of one month.

Cattle

The entire herd consists of 296 head of cattle which includes the native herd of 224 and a grade herd of 72 head.

The native herd consists of: Bulls, 7; Boran cows, 46; Masai cows, 48; calves, 47; others, 76.

The grade herd consists of: Bulls, 1 (Ayreshire pure-bred); cows, 34; others, 37.

The average daily yield of all native cows milked was 8.09 lb.

The average daily yield of all grade cows milked was 9.12 lb.

The average butterfat content of native cows was 5.8 per cent, and the average butterfat content of grade cows was 4 per cent.

The highest daily yield of a native cow was 30 lb., and the highest daily yield of a grade cow was 29 lb.

The total milk produced by the native herd was 129,580 lb., and the total milk produced by the grade herd was 80,448 lb.

Experiments

The native progeny bred from the original foundation stock sired by unrecorded bulls reached the age of milking at a time of drought and locust invasion, but in spite of this deterrent their records show that a substantial yield of milk may be obtained from young animals of from 30 to 38 months old, bred from properly handled native stock. When compared with their dams' records, they show a higher percentage of butterfat, and in several an increased milk production. Some, however, show a slightly smaller milk yield, but considering early maturity their performance was very satisfactory, and is showing an improvement in subsequent lactations.

In summing up the production for 1936, the total milk produced amounted to 12,958 gallons for the herd of 80 cows, which equals 162 gallons per cow.

Milk separated amounted to 6,142 gallons, and yielded 3,880 lb. of butter, an equivalent of 15.8 lb. of milk to 1 lb. of butter. Assuming the butter has an overrun of 20 per cent, this would mean that the average recovery of butterfat from the milk was 5.25 per cent. Taking the fat content of the milk at 5.2 per cent, the total yield of butterfat per cow per year was 85 lb., inclusive of the milk fed to the calf. The figures are calculated on the whole herd, including the dry cows.

These figures compare reasonably well with the average of grade herds in Kenya.

TABLE OF WEIGHTS AND DAILY INCREASE OF NATIVE CALVES

Number of Calf	Weight at Birth	Age	Weight	Increase	Average Increase Per Day
	lb.	Days	lb.	lb.	lb.
24H ..	40	182	176	136	0·74
99 B 3 ..	30	184	199	169	0·91
13 C ..	45	184	200	155	0·84
44 D ..	42	178	196	154	0·86
22 E ..	40	185	209	169	0·91
10 B.1 ..	47	186	200	153	0·82
94 A.2 ..	52	168	177	125	0·74
25 E ..	44	184	200	156	0·84
TOTAL	340	1,451	1,557	1,217	6·66

Average birth weight .. .. 42 lb.
Average increase at 24 weeks .. .. .. 152 ,,
Daily rate of Liveweight increase at six months 0·83 ,,

TABLE OF WEIGHTS AND DAILY INCREASE OF GRADE CALVES

No. of Calf	Weight at Birth	No. of Days	Weight	Increase	Average Increase Per Day
	lb.		*lb.*	*lb.*	*lb.*
4	50	183	224	174	0·95
144	60	184	250	190	1·03
570	50	184	250	200	1·08
50	50	183	231	181	0·98
733	50	173	246	196	1·13
281	50	169	200	150	0·88
150	48	175	189	141	0·80
20	50	157	218	168	1·07
TOTAL ..	408	1,408	1,808	1,400	7·92

Average birth weight .. .. 51 lb.
Average increase at 25 weeks .. .. .. 175 ,,
Daily rate of Liveweight increase at six months 0·99 ,,

The concentrates mixture is made up in bulk in the following manner:—

200 lb. Maize meal,
200 lb. Cake (simsim),
100 lb. Bran,

and is fed according to tables. All the calves were given free access to hay made on the farm, as well as the foregoing rations, and all animals showed a very satisfactory and thrifty appearance at the end of six months.

Rainfall

The rainfall for the year 1936 was 42.23 inches, a considerable increase on last year, but unfavourably distributed, since the greater part occurred during the early months.

Crops

Thirteen acres of maize were planted for stock feed. Ensilage was made with part of this crop; the remainder was fed in the form of maize meal. Hay was made from Rhodes grass and from the indigenous grasses on the station.

Pastures

During the greater part of the year pastures were in good condition, although towards the end of the year almost drought conditions prevailed, and a number of animals, notably in the grade herd, lost condition.

Sheep

A flock of some 174 Masai sheep is maintained for breeding and supply of selected rams to the Masai.

Baraton Training Centre

Pupils

Fourteen pupils remained at the centre at the end of the year. Six pupils completed training in January. Five pupils were admitted in May for a one-year course of training.

Cattle

The station herd now totals 176 head of cattle, as follows: Bulls (including calves), 33; cows, 64; heifers (including calves), 65; steers, 14.

Some 30 calves were reared during the year (22 female and 8 male).

Average birth-weight of calves born, 41.3 lb.; average birth-weight of bull calves, 42.7 lb.; average birth-weight of heifer calves, 40.5 lb.

All calves are weighed at regular weekly intervals until they are 26 weeks old. The average weight of calves which had reached their 26th week was 174 lb. The average gain per day per calf was 0.73 lb.

Dairy

The average daily yield of all cows milked was:—

1934	6.4 lb.
1935	7.0 lb.
1936	7.8 lb.

Ratios.—56,584 lb. of milk returned 4,013 lb. of butter, making a ratio of 14.1 lb. of milk to 1 lb. of butter; 10 lb. of butter returned 7.7 lb. of ghee; 18.3 lb. of milk returned 1 lb. of ghee.

The average butterfat content for the year was 5.50 per cent, and the total milk production was 70,493 lb. The highest daily yield was 23.8 lb. of milk.

TABLE SHOWING MILKING CAPACITY OF THE BARATON HERD OF NANDI CATTLE

	Per cent
3,000 lb. and over in one lactation ..	3 cows or 6·3
2,500 lb. ,, ,, ,, ..	5 cows or 10·4
2,000 lb. ,, ,, ,, ..	10 cows or 20·8
1,500 lb. ,, ,, ,, ..	11 cows or 22·9
1,000 lb. ,, ,, ,, ..	11 cows or 22·9
Below 1,000 lb.	8 cows or 16·7

Rainfall

The rainfall during the year was 67.64 inches.

Crops

Approximately 10 acres of maize were planted; the return was not satisfactory owing to abnormally heavy rains, but $3\frac{1}{2}$ acres of Rhodes grass proved quite satisfactory.

Sangalo Training Centre

Pupils

During the year the course of training at this station was reduced from two years to six months, and entirely confined to the practical aspect of disease control and animal management.

Some forty pupils passed through the training centre during the year.

Cattle

The station herd consists of 170 head of cattle, including 121 head of breeding cattle and oxen.

The average birth-weight of 26 heifer calves was 37.9 lb., and that of 25 bull calves was 40.6 lb.

The average daily gain in weight of calves for 1936 was 0.73 lb.

Dairy

The average daily yield of all cows milked was:—

1935	6.5 lb.
1936	7.77 lb.

The total milk for 1936 was 60,718 lb. Butterfat averaged 5.7 per cent.

Pasture

Most of the energies of labour and pupils have been directed towards improvement of indigenous pastures. This entails heavy bush clearing and heavier clearing of dense masses of tussocks of "sword" grass. Thereafter the land is disc-harrowed, in suitable weather, and rank growth checked by mowing. All paddocks are drag-harrowed to spread manure.

Hay

Several attempts have been made to find hay that is palatable to stock, without success. Rhodes grass, if successful, will supply this requirement, and so fill a long-felt want.

Crops

Only fodder crops were planted. So poor were yields of maize previously obtained that this, combined with the low price of local maize, made it more economical to buy grain. This was crushed or ground into *posho* for stock by machinery at this centre.

Maize was the chief crop planted, and by successive sowings a supply was available from August to December. It was cut green, chaffed, and fed to stock mixed with concentrates.

Napier Grass.—Planted first in 1935, this was available in ample quantity to feed, chopped as in the case of maize, during the dry months at the beginning and end of the year. Planting was extended during the year, confined to heavy bog land.

Rhodes Grass.—Two plots were sown, each approximately half an acre. One, on heavy black soil which holds the water during the rains, was a complete failure; growth never exceeded four inches. On shallow red soil (over murrum) some success was obtained. This plot was first manured, planted with beans, and these ploughed in; seed was sown in June, and the grass cut in early October, by which time the growth was knee-high. Approximately 13 lb. of seed was collected. After cutting, cattle were allowed on to the plot.

They showed no particular desire for the grass. So far it has resisted the inroads of indigenous grasses, and is standing up to drought conditions.

Sheep

The flock consists of 24 ewes, red Masai type, with a ram obtained from Maseno. Thirteen lambs were born. The only mortality was in the case of one lamb. There was no mortality amongst adult sheep and no disease of any kind. 1937 male progeny will be issued to natives.

Machakos Training Centre

Pupils

Twenty pupils completed their two years' course at the end of January, 1936; eight of them obtained employment in the Department, four were employed by the Local Native Council, and one obtained employment on a farm; the remaining seven returned to their homes.

Nine pupils completed a six months' course of practical training. This short course has become very popular with the Wakamba, and eighty applications were received for ten vacancies.

The number of pupils resident at the end of the year was 27.

Cattle

The station herd consists of 219 head of cattle, as follows: Bulls (including calves), 22; cows, 77; heifers (including calves), 89; steers, 31.

Eighty-nine calves were born during the year, and the average birth-weight was practically the same as for the previous year, viz. 37 lb.

The average daily gain in weight of calves at six months was: 1935, 0.31 lb. (28 calves); 1936, 0.60 lb. (45 calves).

The variation in 1936 was from 0.84 lb. per day to 0.34 lb. per day.

Dairy

The average daily yield per cow was:—

1934	5.08 lb.
1935	4.47 lb.
1936	5.83 lb.

The total milk yield for 1936 was 58,827 lb.; the average butterfat yield, 5.54 per cent.

Rainfall

The rainfall for the year totalled 30.97 inches.

The grazing was in excellent condition, and more than adequate for the needs of the stock during the first five months of the year.

During the next three months the grass was dry but ample. There was a decided shortage of herbage towards the end of September and October; a little rain fell during November and December.

Rotational grazing was carried out in six paddocks, and proved beneficial in helping to conserve the food available. Two paddocks were reserved for hay.

Crops

Rhodes Grass.—A small area of half an acre, which was sown with Rhodes grass in May, 1935, was cut for seed in January of this year, and the field sown in November, 1935, was cut in April. Excellent yields of good hay were obtained, but the aftermath was very disappointing. This was thought to be due to the fact that the soil, which is a mixture of black cotton soil and sand, was in a waterlogged condition during the heavy rains in March and April. Towards the end of June and during July the grass was eaten fairly close by the cattle and sheep, and since then little or no growth has taken place owing to lack of rain. A further area of about five acres was sown in November, but again the drought has retarded growth. The stock consumed the Rhodes grass hay fairly readily, but showed a decided preference for ordinary hay.

Napner Grass.—This crop produces excellent yields and is readily eaten by native stock. A further area of about four acres was planted in November.

Maize.—Maize was grown for ensilage, and about 60 tons of ensilage were made in March and April. The pits were opened in August, and the ensilage fed to the milk cows, and was readily eaten.

Sheep

Forty-two rams were issued to the Wakamba during the year. The rams were mainly of Black-headed Persian by native type.

In the early part of the year a Black-headed Persian cross was mated with station ewes. The progeny of these rams grow to a much bigger size than the native Akamba sheep, and are in demand by the natives.

A high mortality occurred in the flock; the cause was not diagnosed, but a number died also as a result of infestations of internal parasites. Dosing for wireworms was carried out regularly before and during the rains.

Maseno Training Centre

Pupils

Fifteen pupils completed the school course during 1936, all of them proceeding direct to employment as follows: Government, 4; Local Native Council, 4; European farms, 5; others, 2.

The full complement of 40 pupils was maintained throughout the year, of whom 29 cames from Central Kavirondo, five from North Kavirondo, five from South Kavirondo and one from the Suk Reserve. Eighteen pupils sat for the primary examination in November, of whom six passed.

Cattle

The station herd consists of 157 head of cattle, as follows: Bulls (including calves), 16; cows, 60; heifers (including calves), 43; steers, 38.

Forty-five calves were born during the year 19 female and 26 male).

The average birth-weight of the calves born during the year was 40 lb., an increase of 1.6 lb. over 1935.

The average birth-weight of 19 heifer calves was 36.6 lb., and that of 26 bull calves was 42.5 lb.

Bull calves were on an average 5.9 lb. heavier than heifer calves.

The total average daily gain for 1936 was 0.67 lb.

Dairy

The average daily yield of all cows milked was:—

1934	...	...	...	...	4.57 lb.
1935	...	...	...	...	5.50 lb.
1936	...	...	...	...	5.93 lb.

Rainfall

The rainfall for the year totalled 55.10 inches, about the average for the last six years.

Pastures

Rhodes grass from Australian seed was planted in a quarter acre block early in April. The results were striking, with a dense stand in full flower eleven weeks after sowing. Enough seed has been saved to plant up a further five acres during the 1937 rains.

The pastures in general have stood up well to a very heavy stock concentration—two cattle to every three acres of available grazing—and at no time was there ever any real shortage of grass. Regular mowing and harrowing, with rotational grazing, have resulted in a steady improvement.

About seven tons of fair quality hay were saved.

Crops

Maize.—The maize crop was seventeen acres, realizing roughly 300 bags, which have been ample for feeding requireemnts. Contour ridges have been enlarged, and the *shamba* liberally composted.

Lucerne.—The lucerne sown to replace that on the plot ploughed in has done fairly well, and has provided a reserve against any unforeseen shortage of green fodder.

Napier Grass.—About three acres adjacent to the farm buildings are now covered with a very dense stand of Napier grass, which has been fed chaffed to milking cows and weaners throughout the year. The rate of growth has been far more rapid than the rate at which it has been consumed.

Edible Canna has been virtually abandoned, except for a small area used for poultry feed.

Selective Breeding

A beginning towards the ultimate establishment of bull camps in the reserves has been made at Maseno, where a paddock was set aside for native-owned heifers brought in for service by a Maseno bull. Although only fourteen heifers were served, the available facilities will be more fully appreciated onec the beneficial results are more apparent.

Sheep

As an experiment the flock was divided into two sections early in the year, one section being transferred to Nyakatch, where conditions appeared ideal. It was impossible, however, to give adequate supervision to this lot, and the results have been disappointing. They are accordingly being returned to Maseno.

Despite liberal feeding and regular dosage against internal parasites, sheep do not appear to thrive at Maseno, and it is doubtful whether the ram lambs will be of high enough quality to justify their issue into the reserve. The Masai-Luo cross-bred ram lambs have been castrated and sold for slaughter purposes. The flock has increased from 89 at the end of 1935 to 105 at the end of 1936, while sales accounted for 16 head and mortality 10 head.

Movement of Stock

Although it is the case that practically all native reserves, certainly the purely pastoral reserves, are quarantined for one or more of the major bovine diseases, it has been possible under immunization and escort to move cattle from most of these areas to the various markets. This applies more particularly to areas quarantined for rinderpest and contagious bovine pleuro-pneumonia. In areas, however, in which outbreaks of foot-and-mouth disease occurred it was necessary to prohibit all movement until the disease had disappeared.

Movement of stock from the native reserves to the settled areas is permitted on permit, provided such movement is not in conflict with regulations under the Diseases of Animals Ordinance. Unfortunately, unauthorized movements do take place and not infrequently bring disease in their train. This is particularly the case in areas in which squatter cattle are tolerated.

Northern Frontier District

Some 65,929 sheep and goats were moved from the great sheep-breeding areas of Wajir and Marsabit via Isiolo to the Kikuyu markets, and from the Garissa district to Lamu 6,745 sheep and goats and 1,424 cattle.

Export figures in respect of sheep and goats moved on permit from the Northern Frontier District via Isiolo and Lamu for the last four years are as follows:—

	Isiolo.	*Lamu.*
1933	41,716 ...	3,088
1934	57,718 ...	4,600
1935	56,184 ...	5,233
1936	65,929 ...	9,745

An appreciable increase may be noted for the year 1936.

Masai District

The following numbers of cattle were exported on permit from the reserve during 1936:—

To Nairobi	3,859
To Kiambu	3,264
To South Kavirondo (approx.) ...	6,000
To Italian Territory	504
To Mombasa, Kibwezi	2,379
Total ...	15,006

Some 23,962 sheep and goats were exported from the Narok district via Kijabe, and were mostly absorbed in the Kikuyu markets in the neighbourhood of Nairobi.

Machakos and Kitui Reserves

During the year 10,520 cattle and 49,243 sheep and goats were moved out of the reserve on permit. A comparison may be made with 9,512 cattle and 76,062 sheep and goats in 1935, and with 3,525 cattle and 37,235 sheep and gots in 1934.

Unauthorized movements on to and off the European-owned farms and the Yatta Plains continued unabated, and were responsible for all the outbreaks of rinderpest on farms. A difficult position will arise when the stock on the Yatta is reduced to the accepted figure of 10,000 cattle, as at present there are approximately 40,000 adult cattle and 8,700 calves on the Yatta Plains.

A number of heifers were bought by Masai natives during the year in the Machakos Reserve.

Central Kavirondo

The export of cattle from this district is mainly through Kibigori Quarantine Station. No cattle were exported on permit to Uganda from the district during the year 1936.

Some 941 head of cattle passed through the Quarantine Station, in addition to 984 head of trade and farm stock and 652 sheep and goats passed out on permit.

Export to destinations outside Central Kavirondo Reserve:—

	1934.	1935.	1936.
Bullocks	1,269	351	658
Heifers	5,477	926	283
Sheep and Goats ...	8,532	1,301	652

North Kavirondo

Outward movement from the reserve has been very much greater than in 1935, but is still not so great as the inward movement.

	1935.	1936.
Inward	6,250	4,744
Outward	326	3,840

Movement outwards consists almost entirely of squatter stock. A comparatively small number of cattle are sent by traders to Eldoret auctions, whilst a further small number consists of young animals (mostly heifers) purchased by European farmers.

South Kavirondo

From 16,000 to 18,000 head of cattle may be considered as being a reasonable estimate of the total annual imports into Central Kavirondo from South Kavirondo. It is as yet impossible to state with certainty what percentage of this total emanates from Tanganyika Territory, but it is probably in the region of 40 per cent, while the Trans Mara Masai contribute probably another 20 to 25 per cent.

During 1936 permits were issued for the movement of 8,270 head from South to Central Kavirondo, while 6,104 head were sold at Nyangussu market on the Kisii-Masai border, this representing Masai exports into South Kavirondo.

Samburu District

The following figures indicate the movement of cattle from this district:—

To Meru and Isiolo	711
To Italian Territory (overland) ...	442
To Solai, Italian Territory and Local Markets	1,351
To Mombasa	100
Total ...	2,604

Some 4,523 sheep and goats were exported via Isiolo and also 419 donkeys.

All cattle exported from Samburu on permit were immunized prior to export against rinderpest and contagious bovine pleuro-pneumonia.

Baringo Reserve

Exported on permit from this district:—

Cattle	194
Sheep and Goats	18,433
Donkeys	626

Nandi Reserve

Approximately 8,000 head of cattle were moved on permits issued by the district staff; numbers in respect of other permits issued are not available. Also 3,833 sheep and goats were moved from the district on permit.

Lumbwa Reserve

There is a large export of slaughter stock to the neighbouring Kavirondo Reserves. The prices reached as high as Sh. 70 per bullock, and the demand exceeded the available supplies. Figures in respect of the number of cattle moved are not available.

Coast Province

Stock passed through Mariakani Station:—	
Cattle	5,793
Sheep and Goats	13,259
Stock passed through Makowe Station:—	
Cattle	1,918
Sheep and Goats	9,895
Stock exported to Zanzibar:—	
Cattle	1,393
Sheep and Goats	7,057

NATIVE MARKETS AND SLAUGHTERING OF STOCK

The pastoral native living in his ordinary environment, although he may possess an ardent and constant desire for meat, has an intense objection to slaughtering his own cattle, except on certain occasions of festivity or celebration. Milk, blood, mutton, and maize meal, as obtainable, constitute the ordinary diet amongst such people. Butchers' shops, except at European stations, are practically unknown in the pastoral reserves. The Turkana people are, however, an exception; they are purely pastoral only because their country is not suitable for agriculture.

Amongst the people of the Kavirondos, who possess large herds of cattle and are also agriculturists, the position is entirely different. They are the largest meat-eating tribes in the Colony. Estimates submitted account for a total of approximately 78,000 head of cattle slaughtered at recognized slaughtering places in the three Kavirondo districts during the year. This is a conservative figure, since the total number of hides exported during 1936 was 159,000, of which approximately 65 per cent may be considered as having been hides from slaughtered animals.

In these districts the policy of concentrating departmental activities in the neighbourhood of native markets has continued, and control of markets has been facilitated by the transference of the nine major markets in Central Kavirondo to the Local Native Council. A further advance is foreshadowed by a pending resolution of the Council, which will

require that cattle may be slaughtered only at those places where a hide *banda* has been erected. This will reduce the haphazard slaughterings at the roadside, which is such a feature in Kavirondo, and should eventually result in a very much higher standard of flaying.

The erection of butchers' shops in the larger markets and the provision of zinc-topped tables for meat in the smaller centres is undoubtedly serving as a stimulus to an increased consumption of meat. On the other hand, the fact that the average price of meat throughout 1936 has been 20 to 25 cents per pound in all markets has inevitably limited consumption, while with good crops and bulging grain bins the numbers of cattle slaughtered appear to have decreased.

It is possible, however, to estimate fairly closely the average slaughterings in different areas, although there are seasonal fluctuations due to (*a*) the cotton season, and (*b*) scarcity of fish. 100,000 head per year would not be a gross over-estimate of the number of cattle slaughtered in the three Kavirondo districts.

Castrations

A disproportionately high number of bulls may be observed in most native herds; little, if any, selective breeding is practised, and thus females are mated in a most haphazard manner. Such a form of animal management is not conducive to herd preservation. The castration of undesirable males is one method of counteraction. Pupils at African veterinary training centres are instructed in the technique of the operation, and field services are provided as circumstances permit.

The results in certain reserves are:—

District	1934		1935		1936	
	Bulls	Rams, Sheep & Goats	Bulls	Rams, Sheep & Goats	Bulls	Rams, Sheep & Goats
Central Kavirondo	2,200	—	3,135	607	5,226	1,416
South Kavirondo	160	—	692	—	1,065	—
North Kavirondo	—	—	682	—	3,039	—
Machakos ..	—	—	2,560	1,161	3,983	2,278
Nandi Resv.	—	—	—	—	145	
Total ..	2,360	Nil	7,069	1,768	13,458	3,697

Poultry

Breeding flocks of pure-bred fowls are maintained at Maseno, Machakos, and Baraton Veterinary Training Centres, and also at Mariakani, Coast Province, for the issue of pure-bred birds to improve native flocks.

In the Machakos district issues of pure-bred fowls and eggs continued during the year, the numbers being 80 fowls and 1,864 eggs.

The majority of eggs and fowls go to the location of Iveti, close to Machakos. This is perhaps a good scheme, as it means that a steady and fairly rapid increase of improved birds is being effected in one area, instead of an infiltration of improved blood over a much wider area to such a slight degree that it would almost certainly be obliterated by the normal poor strain. A number of birds from Nairobi were purchased in order to introduce fresh blood into the existing strain at the training centre; six of these birds were issued to the six most active and promising village schools.

Small breeding pens are maintained at some of the Government schools, and from these eggs and chickens are given to the local natives.

Issues of Rhode Island Red poultry from Maseno and Ongongo also continued throughout 1936, but a charge of Sh. 1 per bird issued from Maseno served to depress the demand. This charge had become necessary owing to the fact that some recipients of free birds during previous years had promptly sold them and appropriated the proceeds. The total issues were 347 fowls and 27 dozen eggs from Maseno, and 23 cockerels and 123 settings of ten eggs each from Ongongo.

The poultry scheme at Baraton was maintained on the same lines as in previous year. A number of pullets and cockerels were issued to the more progressive natives.

From Mariakani Centre, five birds and 565 eggs were distributed amongst natives during the year.

The Division of Animal Industry gratefully acknowledges the financial assistance given by Local Native Councils, without which much of the industrial work carried out in native reserves would have been impossible.

H. H. BRASSEY-EDWARDS,
Deputy Director (Animal Industry) and Chief Veterinary Officer.

Part III.—Financial

Statements of expenditure and revenue for the fiscal year under review are given below:—

Expenditure	Amount Originally Sanctioned	Amount Expended
	£	£
"A" Administrative and General (including Total Cost of Headquarters Staff)	9,615	9,098
Grant to Royal Agricultural and Horticultural Society of Kenya	500	500
Contribution to Imperial Bureaux of Entomology and Mycology	300	300
Contribution to Amani Institute	2,028	2,028
Contribution to Imperial Bureau of Mycology	150	150
Grant to Imperial College of Tropical Agriculture, Trinidad	250	250
Contribution to Colonial Agricultural Service	140	140
Contribution to Imperial Agricultural Bureaux	525	516
Expenses of Board of Agriculture	450	456
Grant-in-Aid to Sisal Industry	1,000	1,000
Contribution to E.A. Agricultural Journal	612	—
Contribution to Locust Research	408	408
Rabies Campaign	50	38
Improvement of Hides and Skins, etc.	200	200
Maize Export Guarantee	12,500	12,500
Meat Export	—	53
"B" Division of Plant Industry	11,477	11,206
Subdivisions—		
Native Agriculture	18,530	20,319
Scott Agricultural Laboratories	10,071	10,140
Plant Breeding Services	3,178	3,129
Grading, Conditioning, etc.	5,468	6,242
"C" Division of Animal Industry	17,595	16,987
Subdivisions—		
Veterinary Research	22,460	24,537
Native Services	19,294	18,546
£	136,801	138,743

Revenue	Original Estimates	Actual Receipts
	£	£
Grading, Conditioning and Cold Storage Fees, etc.	4,500	8,341
Sale of Farm Produce and Stock	900	1,080
Sale of Stores	50	402
Veterinary Inoculation Fees, etc.	8,040	12,969
Sale of Sera, Vaccines and Laboratory Products	3,000	4,972
£	16,490	27,764

Part IV. Agricultural Legislation

The following legislation affecting agricultural industries was enacted during the year:—

ORDINANCES

Agricultural Mortgagors' Relief (Amendment) Ordinance, 1936.
Branding of Stock (Amendment) Ordinance, 1936.
Coffee Industry (Amendment) Ordinance, 1936.
Coffee Industry (Amendment No. 2) Ordinance, 1936.
Farmers' Assistance Ordinance, 1936.
Kenya Cotton (Amendment) Ordinance, 1936.
Land and Agricultural Bank (Amendment) Ordinance, 1936.
Marketing of Native Produce (Amendment) Ordinance, 1936.
Sisal Industry (Amendment) Ordinance, 1936.

RULES AND REGULATIONS

Under the Agricultural Produce Export Ordinance (Cap. 98 of the Revised Edition):—
- Grading of Beans Rules, 1936.

Under the Crop Production and Live Stock Ordinance, 1936:—
- Native Potatoes Inspection Rules, 1936.
- Hides and Skins (Amendment) Rules, 1936.
- Wattle Bark (Marketing) (Amendment) Rules, 1936.
- Samburu (Grazing Control) Rules, 1936.
- Native Produce and Improvement and Inspection Rules, 1936.
- Native Maize Inspection (European Areas) Rules, 1936.
- Flax Seed (Export and Import) Rules, 1936.

Under the Diseases of Animals Ordinance (Cap. 157 of the Revised Edition):—
- Diseases of Animals (Amendment) Rules, 1936.
- Diseases of Animals (Amendment No. 2) Rules, 1936.
- Diseases of Animals (Amendment No. 3) Rules, 1936.

Under the Diseases of Plants Prevention Ordinance (Cap. 155 of the Revised Edition):—
- Diseases of Plants Prevention (Amendment) Rules, 1936.
- Diseases of Plants Prevention (Amendment No. 2) Rules, 1936.
- Diseases of Plants Prevention (Coffee) (Amendment) Rules, 1936.

Under the Farmers' Assistance Ordinance, 1936:—
- Farmers' Assistance (Forms) Rules, 1936.

Government Cool Stores, Kilindini: Amendment to Schedule of Charges.

Under the Marketing of Native Produce Ordinance, 1935:—
- Maize, Legumes, Simsim and Potatoes (Marketing) Rules, 1936.
- Wattle Bark (Marketing) Rules, 1936.

Under the Sale of Pyrethrum Ordinance, 1935:—
- Sale of Pyrethrum Rules, 1936.

PUBLICATIONS

EAST AFRICAN AGRICULTURAL JOURNAL

VOL. I, NO. 4:

"Report on Grassland Improvement in Kenya, 1934," by D. C. Edwards, Agricultural Officer in Charge of Grassland Improvement.

"Notes on Conditions Influencing Quality in Coffee," by A. D. Trench, Senior Coffee Officer.

"Coffee Thrips: A Contribution to our Knowledge of the Cause of Outbreaks," by F. B. Notley, Entomologist.

"An Equine Pregnancy Diagnosis Service," by Dr. J. Anderson, Veterinary Research Officer.

"The Scott Agricultural Laboratories."

"Essential Oils," by V. A. Beckley, Senior Agricultural Chemist.

"Overstocking in Kenya—II."

"An Inexpensive Wooden Drag for Use in the Construction of Mangum Broad Base Terraces," by C. Maher, Agricultural Officer.

"Elephant Grass as a Cattle Fodder in Kenya," by C. Maher, Agricultural Officer.

"A Note on Cultivation Methods on Light Soils," by C. Maher, Agricultural Officer.

"Control of Striga Weed in Nyanza Province, Kenya," by W. L. Watt, Agricultural Officer.

"Some Aspects of the Poultry Industry in Kenya," by R. S. Ball, Agricultural Officer.

VOL. I, NO. 5:

"Tenure of Native Land in East Africa: The Economic Aspect," by V. Liversage, Agricultural Economist.

"The Culture of Granadillas."

"Mixed Farming in East Africa—I," by R. S. Ball, Agricultural Officer.

"Mulches," by C. Maher, Agricultural Officer.

"Live Hedges for Paddocking."

VOL. I, NO. 6:

"Conservation of Soil Fertility on Coffee Estates," by G. H. Gethin Jones, Soil Chemist.

"Essential Oils—II," by V. A. Beckley, Senior Agricultural Chemist.

"Whisk or Broom Corn."

"A Revised List of Plant Diseases in Kenya Colony," by J. A. McDonald, Senior Plant Pathologist.

VOL. II, NO. 1:

"Mixed Farming in East Africa—II," by C. Maher, Agricultural Officer.

"Soil Erosion: A Simple Home-made Level for Obtaining the Line of Contour Banks."

"Report on a Visit to Southern India and Java—I," by S. Gillett, Agricultural Officer.

"Ramie, Rhea Fibre or China Grass."

VOL. II, No. 2:

"Essential Oils—III," by V. A. Beckley, Senior Agricultural Chemist.

"Land Utilization as a National Problem, With Special Reference to Kenya Colony," by C. Maher, Agricultural Officer.

"Report on a Visit to Southern India and Java—II," by S. Gillett, Agricultural Officer.

VOL. II, No. 3:

"Report of the Senior Coffee Officer, Kenya, for 1935," by A. D. Trench, Senior Coffee Officer.

"Pest on Ramie."

"Pseudococcus Kenyae (Le P.) and Climate," by F. B. Notley, Entomologist.

"Kenya Coffee: A Graphic Analysis of Post-war Price," by V. Liversage, Agricultural Economist.

GENERAL

"Final Report on Coffee Berry Disease Investigations in 1935," by J. McDonald, Senior Plant Pathologist. (*Monthly Bulletin of the Coffee Board of Kenya,* Vol. II, No. 16.)

"Some Crop Records from Individual Trees," by C. A. Thorold, Plant Pathologist. (*Monthly Bulletin of the Coffee Board of Kenya,* Vol. II, No. 19.)

"The Susceptibility of Harar Coffee to Disease," by J. McDonald, Senior Plant Pathologist. (*Monthly Bulletin of the Coffee Board of Kenya,* Vol. II, No. 22.)

"Differences in the Resistance to the Instars of a Pentatomid to Pyrethrum Powder," by F. B. Notley, Entomologist. (*Bulletin of Entomological Research,* Vol. 27, No. 4.)

"Progress Report on Parasites of Mealy Bug," by H. Wilkinson, Entomologist. (*Monthly Bulletin of the Coffee Board of Kenya,* Vol. II, No. 23.)

"Antestia Control with Dry Pyrethrum," by F. B. Notley, Entomologist. (*Monthly Bulletin of the Coffee Board of Kenya,* Vol. II, No. 13.)

"Mealy-bug Control." (*Monthly Bulletin of the Coffee Board of Kenya,* Vol. II, No. 21.)

"A Note on the Manuring of Coffee," by G. H. Gethin Jones, Soil Chemist. (*Monthly Bulletin of the Coffee Board of Kenya,* Vol. II, No. 15.)

"The Effect of Lime on the Preparation of Coffee," by V. A. Beckley, Senior Agricultural Chemist, and T. L. McClelland, Plant Inspector. (*Monthly Bulletin of the Coffee Board of Kenya,* Vol. II, No. 23.)

"Some Notes on Coffee Shade in Subukia," by T. L. McClelland, Plant Inspector. (*Monthly Bulletin of the Coffee Board of Kenya,* Vol. II, No. 30.)

"The Value of Selection Work on Coffee," by S. Gillett, Agricultural Officer. (*Monthly Bulletin of the Coffee Board of Kenya,* Vol. II, No. 21.)

"Coffee Growing in Songhor," by S. Gillett, Agricultural Officer. (*Monthly Bulletin of the Coffee Board of Kenya,* Vol. II, No. 24.)

(A list of publications by officers of the Veterinary Research Laboratory is given in the Report of the Chief Veterinary Research Officer.)

STAFF LIST

AS AT 31ST DECEMBER, 1936

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Assistant Chief Veterinary Research Officer—Vacant.

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Entomologist—E. A. Lewis, M.Sc., Ph.D.

Laboratory Superintendent—A. J. Kemp.

Laboratory Assistants—J. T. Schultz, H. J. Gray, J. R. McQueen, J. Forsyth, E. J. Hall, W. P. Bruce, S. R. Pelling, F. Lyons, M.P.S. (Lond.).

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Clerk-Librarian—Miss D. Gent-Wood.

Mechanic—O. Stenmark.

Storekeeper—G. W. Clochley.

Laboratory Students—D. N. Lewis, D. H. McCalman, T. K. Hill, A. J. Wiley.

PRINCIPAL CHANGES AND NEW APPOINTMENTS IN TECHNICAL STAFF DURING 1936

Division of Plant Industry

Mr. F. B. Notley, Entomologist, proceeded to Tanganyika Territory on the 31st October, 1936, on transfer to Lyamungu Coffee Research Station.

Mr. A. R. Melville appointed Entomologist, 6th November, 1936.

Mr. T. H. Jackson appointed Junior Laboratory Assistant, 13th January, 1936.

Mr. L. A. Elmer appointed Assistant Agricultural Officer, 9th April, 1936.

Mr. G. J. Gollop appointed Assistant Agricultural Officer, 21st April, 1936.

Division of Animal Industry

Dr. James Anderson, Veterinary Research Officer, was seconded for duty at the Live Stock Experimental Station, Naivasha.

Mr. H. Hay Barclay, Veterinary Officer, proceeded on leave on 22nd August, 1936, pending transfer to Nigeria.

Mr. A. J. Wiley appointed Laboratory Student, 7th January, 1936.

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